# NATUR CYMRU
## *Nature of Wales*

Number/Rhif 58 • Spring/Gwanwyn 2016

- May elections – party views
- Enlightened agriculture
- Cloddiau cerrig
- Native oysters
- Pumlumon
- Lichenology
- When to intervene
- Skokholm & Skomer

Books, news, comment ...

*Bywyd gwyllt prin ar Sgogwm, wedi'i ddarlunio gan ymwelwyr*
*Rare wildlife on Skokholm, as painted by visitors*

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***Llun y clawr/Front cover:***
Visitors to Skokholm Island were encouraged to paint rare wildlife on the walls of the toilet. Unfortunately these were lost due to decay, but not before they had been photographed. Our cover features a selection, with our thanks to the Skokholm wardens and all the artists.


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*Cladonia polydactyla*

Mike Sutcliffe

# GOLYGYDDOL EDITORIAL

Cyn etholiadau'r Cynulliad ym mis Mai, roeddem yn credu y gallai ein darllenwyr fod â diddordeb ym marn y gwahanol bleidiau ynghylch materion amgylcheddol amrywiol. Felly, rydym wedi llunio rhestr o gwestiynau a gallwch ddarllen eu hymatebion yn y rhifyn hwn. Mewn erthygl gysylltiedig, mae Ian Rappel yn siarad â Colin Tudge am ei ymgyrch hir ar gyfer ffermio go iawn. Mae prosiect Tirweddau Byw Ymddiriedolaeth Natur Sir Drefaldwyn ar Bumlumon wedi bod ar y gweill ers peth amser bellach, ac mae Liz Lewis-Reddy yn amlinellu ei lwyddiannau sylweddol hyd yn hyn.

Mae Andy Woolmer eisiau i wystrys brodorol ailsefydlu yn ardal Bae Abertawe, ac mae'n ymddangos ei bod yn dasg eithaf anodd. Mae Rob Parry yn trafod pryd a pham y dylid ymyrryd yn uniongyrchol mewn cadwraeth natur, yn hytrach na gadael i natur ddilyn ei chwrs ei hun. Mae Rob yn defnyddio llygod pengrwn y dŵr a gweilch y pysgod fel dwy o'i enghreifftiau. Daeth yr Ail Ryfel Byd i ben 70 mlynedd yn ôl, ac mae David Saunders yn dweud wrthym sut y dechreuodd astudiaethau maes a chofnodi adar yn syth ar ynysoedd Sgomer a Sgogwm. Gall cennau fod yn anos i'w hadnabod nag adar, ond mae Tracey Lovering yn egluro ei bod wedi gwirioni arnynt ac mae'n annog mwy ohonom i ddilyn ei hesiampl.

Ac yn olaf, mae Twm Elias a'i gyd-awduron yn sôn am hanes, daeareg a bywyd gwyllt waliau cerrig ucheldiroedd Cymru, yn seiliedig ar gynhadledd a gynhaliwyd yn 2014 ym Mhlas Tan y Bwlch. Bu cael gafael ar gyfieithiad Saesneg ystyrlon o'r cyfraniad hwn yn dipyn o her, oherwydd gwahanol ystyron posibl *clawdd* a *cloddiau*!

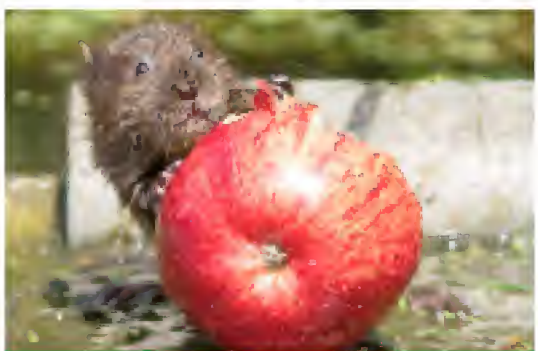
**Geoff Gibbs**

In advance of the Assembly elections in May we thought that readers might be interested in what the different parties thought about various environmental issues. So we put a list of questions together and you can read their responses in this issue. In a related article, Ian Rappel talks to Colin Tudge about his long-running Campaign for Real Farming. The Montgomeryshire Wildlife Trust's Living Landscapes project on Pumlumon has been underway for some time now, and Liz Lewis-Reddy outlines its considerable achievements so far.

Andy Woolmer wants to get native oysters re-established in Swansea Bay, and it turns out to be quite a struggle. Rob Parry discusses when and why to intervene directly in nature conservation, as opposed to letting nature take its course. Rob uses water voles and ospreys as two of his examples. The Second World War finished 70 years ago, and David Saunders tells us how field studies and bird recording started straight away on the twin islands of Skomer and Skokholm. Lichens may be more difficult to identify than birds, but Tracey Lovering explains that she has become enthralled by them and encourages more of us to follow suit.

Last but not least, Twm Elias and co-authors talk about the history, geology and wildlife interest of stone walls in upland Wales, based on a conference held at Plas Tan y Bwlch in 2014. Obtaining a meaningful English translation of this contribution proved to be quite a challenge, because of the various possible meanings of *clawdd* and *cloddiau*!

**Geoff Gibbs**



Norman West

Water voles are hanging on at Magor Marsh

Nicholas Moylan, GWT

# Politics and Environment: views of the Parties

Magor Marsh, the last relatively natural area of fenland on the Gwent Levels

*Do environmental issues influence the way people vote? From the media interest which the subject has attracted in recent elections, you might conclude that the answer is 'not much' or 'not at all'. Judging by what we know of our readership, many people in Wales feel passionately about environmental issues. But how easy is it to judge and compare the environmental approaches of the main political parties ahead of the Welsh Assembly elections in May?*

We decided to try to clarify the environmental stance of the parties. We therefore wrote to the six main parties asking for a short general statement and brief answers to four questions. These concerned the marine environment, Common Agricultural Policy, Natural Resources Wales, and development pressures on the environment. The replies to our letters varied in length, and some included general statements while others did not. Of those that did, the Green Party emphasised energy policy (in favour of tidal barrage schemes, against fracking) and Labour and Liberal Democrats emphasised the importance of climate change, the latter also stressing the need to halt biodiversity loss (and the links between the two issues).

Collectively they were too long to publish, but we have tried to represent the main points they contained as fully and fairly as possible. The full responses appear on our website, so please visit www.naturcymru.org.uk to read them. Even better, you could ask your candidates about their views. It really matters to have elected AMs who care about and understand environmental issues, whether in Government or Opposition.

After each of the four questions we have summarised the responses we received from the five political parties which responded (UKIP did not reply). These are, in alphabetical order, Plaid Cymru, Wales Green Party, Welsh Conservative, Welsh Labour, and Welsh Liberal Democrat.

We hope you find the results interesting and informative. They reveal many and varied points of view and policy intentions. We are extremely grateful to all those who provided responses to our questions, namely:

**Llyr Gruffydd AM,** Plaid Cymru;

**Tom Sharman,** Policy Communications Manager, Wales Green Party;

**Janet Howarth AM,** Welsh Conservative Party;

**Martin Eaglestone,** Welsh Policy Officer, Welsh Labour Party;

**William Powell AM,** Welsh Liberal Democrats Shadow Minister for the Environment & Rural Affairs.

***QUESTION 1:*** *What do you think are the main threats to the marine environment caused by human activities? How would you address these, and would marine conservation zones be a priority?*

Trawling, in particular industrial trawling, poses the greatest threat to our marine environment.

- Our marine fisheries have to be managed sustainably, in a way that not only safeguards the survival of our valued fish species, but also our unique marine habitat. We should ensure that our fisheries operate under a robust regime, based on scientific advice.
- A consultation was launched recently to create six new marine protected areas. A Plaid Government would support the recommendations of the consultation and work with counterparts in the UK Government and EU to ensure that our network of marine protected areas are effectively enforced.

We consider that the main threats to our marine environment are overfishing, climate change, plastic pollution and diffuse pollution from agriculture.

- Marine conservation zones are one of the best ways of ensuring that our fish stocks and marine ecosystems remain healthy, but they need to be enforced.
- We would ban damaging scallop dredging in SACs, fully protect our existing SACs and consult on protecting enough of our ocean to ensure healthy seas and a robust fishing industry for future generations.

We consider marine conservation zones to be a priority.

- We plan to expand the network of UK Marine Conservation Zones to create a 'Blue Belt' of protected sites around the UK to safeguard precious marine habitats.
- We would encourage local authorities to encourage those participating in marine leisure pursuits to bring discarded rubbish ashore and meet the costs of disposal.

We recognise the value of Wales' marine and coastal environment.

- Wales is the first country in the world to have a formal trail the whole way around its coast.
- We are currently consulting on further action in the marine environment to help build on the integrated approach to our marine environment.

One issue of immediate concern for the WLDs is the proposal which the Welsh Government is currently consulting on regarding the opening of a scallop fishery in Cardigan Bay.

- Our party shares the concerns of many environmental groups that dredging of this kind would change the physical nature of the seabed, causing harm to many species dependent on it.
- We will be responding to the consultation and expressing these concerns.

***QUESTION 2:*** *Do you think Pillar 1 of the Common Agricultural Policy (CAP) is delivering significant environmental benefits for the taxpayer? Are there any ways in which you and your Party would seek to reform CAP and the way in which it is administered in Wales to deliver improved environmental outcomes and public benefits?*

The CAP presents many opportunities that would bring environmental benefits, and a Plaid Government would seek new and creative ways to capitalise on this potential.

- Pillar 1 can contribute to climate change mitigation objectives; as the Pontbren Project demonstrates, by thinking more creatively about our land management, it is possible to bring even greater benefit to both Welsh agriculture and the wider public.
- We believe that all farmers should have access to agri-environmental schemes to encourage and reward positive environmental management. A Plaid Cymru government will ensure that a part-farm scheme is made available.

There is ample opportunity within CAP to improve the agriculture sector's resource efficiency and environmental performance.

- Within Pillar 1, strong cross-compliance and greening ought to ensure high environmental and animal and public health standards throughout EU agriculture.
- The intended benefits of these standards must be better communicated to farmers. The two-pillar system is inhibiting a change in mindset regarding the CAP. Payments are not by right; they ought to be accorded in exchange for public goods; CAP is still biased in favour of industrial-scale agriculture, rather than smaller-scale farmers and the biodiversity they can bring.

The transfer of 15% from Pillar 1 (direct payments to farmers) to Pillar 2 (rural development fund), the highest in Europe, puts Wales at a competitive disadvantage in the market place.

- We will work with our UK Government colleagues to generate a fairer deal for farmers and reduce the 15% modulation rate.
- We support calls for a mid-term review of CAP in 2017, and support farmers in their claims for a timely and full payment from CAP funds.

The decisions we have already taken as regards CAP will underpin investment in the rural economy through the Rural Development Plan.

- This will also continue the process of reform for the agricultural sector.
- We believe that forestry has further potential for integrated land and water management, and the economy of Wales.

We consider that Pillar 1 is delivering significant environmental benefits.

- We have seen the largest transfer of funds to Pillar 2 at 15%, and the remaining Pillar 1 is essential to retaining the presence of our farmers to till the soil.
- Both Pillars of the CAP are completely contingent on the UK voting to remain in the EU, and that must be a huge priority for the agricultural community - but also crucially the environmental sector - in the coming months.

Phil Dolby CC by 2.0

***QUESTION 3:*** *Do you think measures are needed to improve the performance of Natural Resources Wales (NRW) in fulfilling its duties and responsibilities towards wildlife and the natural environment, and if so, what would these be?*

We attempted to amend the Environment Bill which is currently before the National Assembly in order to give NRW a stronger environmental remit, for without such an amendment Wales could be left

without an organisation whose primary role is that of championing the environment.

- As it stands NRW is required to manage Wales' natural resources in a way that contributes to the achievement of all seven of the recently adopted Wellbeing Goals stipulated by the Wellbeing of Future Generations Act. This is a very broad remit, placing an all-encompassing responsibility for economic, social, cultural and environmental goals upon NRW.
- Plaid Cymru have pressed the Welsh Government several times to ensure that NRW is sufficiently resourced to perform these new duties as well as their current core functions. A Plaid Cymru government would make sure that NRW has the resources to be the environmental champion Wales needs.

The major issue facing NRW is the severe budget cuts it is facing. However, more can be done with less, for example if we shift from thinking about flood defences to flood prevention.

- We desperately need better upland management including a huge tree-planting programme, and catchment-area flood management. We will ensure that woods are considered as an integral part of Local Development Frameworks. Planning authorities will be required to liaise with NRW and other bodies when dealing with the establishment of new woods and the management of existing ones.
- We will encourage NRW to carry out a thorough review of the complicated system of (Countryside) designated areas. In the long term, we will seek the continued expansion of conservation principles to the whole of the countryside.

Natural Resources Wales is only a young institution in its current make up.

- We would support a timely review of its effectiveness.
- We are mindful that it lacks the powers and independence from Government of similar bodies in other parts of the UK and we would seek to address this. Its independence from Government is a key aspect in enabling it to discharge its functions.

Our goal is to ensure the best possible use, in the wider public interest, of all of our resources as a nation.

- Much of our work over the last four years has been to support this through measures to greatly increase the efficiency with which resources, including energy, are used and we will build upon this record in the fifth term of the National Assembly – our Welsh Parliament.
- We successfully established NRW, the single body central to our approach for the joined-up management of our natural resources.

The newly passed Environment (Wales) Bill will see NRW have a number of new duties and responsibilities, the most important of which is to maintain and enhance biodiversity. NRW will have to assist Welsh Ministers in publishing a list of the living organisms and types of habitat which are of principal importance increasing biodiversity in Wales, and will provide an assessment of biodiversity in Wales so that progress with regards to biodiversity can be measured.

- NRW is likely to see significant cuts to its budget in the future and, with resources already being stretched, there is very real concern that this will result in genuine and lasting harm to the organisation and its ability to fulfil its function effectively.
- I am concerned that cuts to NRW and the Natural Resources budget will be disproportionate but, given that some cuts are inevitable, it is vital that NRW works closely with third sector groups in order to share knowledge and expertise for mutual benefit.

***QUESTION 4:*** *Sustainability of major land-use changes (such as the Circuit of Wales, M4 Relief road); do the stated advantages of the developments (some of which may not turn out as claimed) outweigh the permanent loss of key habitat?*

The permanent loss of key habitat, or the depriving of future generations of the beauty and delights of our natural treasures, cannot be taken lightly. Such a rationale lay behind the Wellbeing of Future Generations Act passed by the

Welsh Assembly, and one which Plaid Cymru considers of paramount importance.

- It is evident that if NRW had a clearer remit as a guardian of the environment, such land-use changes would not have come to fruition.
- If the Wellbeing Goals stipulated by the Wellbeing of Future Generations Act are applied effectively, then plans such as developing the Black Route option for the M4 relief road through the Gwent Levels should never see the light of day. We believe that this particular example will be a litmus test for the new Act.

We are completely opposed to the proposed M4 relief road, which would destroy the nationally important wetland area of the Gwent Levels, home to almost 200 rare species.

- At £830m, creating a new relief road for the M4 is not only hugely environmentally damaging but also incredibly expensive.
- Other traffic management measures for the Newport area would represent far better value for money and still ensure that Newport's precious 'green lung' can continue to provide a home for species and benefit local residents.

Our natural ecosystems are a priority for us, and that is why we believe that every major land-use change and planned development such as the Circuit of Wales or M4 relief road should be properly considered and weighed up before any decision is made.

- Each project has its own set of circumstances and balance of positives and negatives, so there can be no 'one size fits all' solution. My predecessor Antoinette Sandbach fought a strong campaign to ensure that the environment concerns surrounding the Circuit of Wales were fully addressed and I hope that her work isn't ignored as we move into the construction phase.
- I do not believe that we should always oppose progress and development but we must ensure that the environmental impact of schemes such the M4 relief road and Circuit of Wales are fully taken into account at the start of the process as we cannot correct things retrospectively.

We believe that major infrastructure investment forms part of delivering a more sustainable future for Wales. This can include investment in all modes of transport.

- We have also invested over £245m during this Assembly term in flood and coastal defences supported by an additional £50m from Europe.
- During the 2011-2016 Assembly we delivered on our promises for Wales. This will provide the basis for working together for the Welsh environment during the fifth term of the Assembly.

The Liberal Democrats and I, as Shadow Minister for the Environment, approach both the Circuit of Wales and the M4 relief road with a high degree of scepticism.

- I remain to be convinced that the benefits of the Circuit of Wales will outweigh the environmental harm, but given that it looks set to go ahead, we must make sure that the best is made of the situation, in terms of planning conditions and community payback.
- The M4 Relief road is far from a lost cause in terms of the party's campaign against the proposed Black Route. We will continue to campaign for an alternative route which is less expensive, less likely to damage vast swathes of our environment and is academically supported.

## Gwleidyddiaeth a'r Amgylchedd

Gan fod etholiadau Cynulliad Cymru ar fin cael eu cynnal ym mis Mai 2016, penderfynodd Natur Cymru fynd at y prif bleidiau gwleidyddol – Plaid Cymru, Plaid Werdd Cymru, Ceidwadwyr Cymru, Llafur Cymru, Democratiaid Rhyddfrydol Cymru a UKIP – i gael eu safbwyntiau ar rai materion amgylcheddol allweddol. Roedd y rhain yn ymwneud â'r amgylchedd morol, Polisi Amaeth Cyffredin, Cyfoeth Naturiol Cymru, a phwysau datblygu ar yr amgylchedd. Roedd yr ymatebion a dderbyniwyd yn amrywio o ran hyd a manylder. Rydym wedi crynhoi'r ymatebion a gawsom gan y pum plaid wleidyddol a ymatebodd (ni wnaeth UKIP ymateb) a cheisio amlygu'r prif bwyntiau mor drylwyr ac mor deg ag y bo modd. Gellid darllen yr ymatebion llawn ar ein gwefan www.naturcymru.org.uk

Twm Elias

# Er clod i'n cloddiau cerrig

Cwm Dulun, Dyffryn Nantlle. Wal fynydd o gerrig onglog
Mountain wall of angular stones

*Mae cloddiau cerrig, neu waliau cerrig mewn rhai ardaloedd, yn rhan annatod o dirlun llawer o ucheldiroedd Cymru. Gallant ddweud llawer wrthym am hanes amaethyddiaeth yng Nghymru ac maent yn gynefinoedd a llochesi pwysig i fywyd gwyllt. Seilir yr erthygl hon gan* ***TWM ELIAS, JOHN H DAVIES*** *a* ***DAFYDD ROBERTS*** *ar drafodion cynhadledd: 'Er clod i'n cloddiau cerrig'*[1]*.*

Mae codi cloddiau o bob math yn dyddio nôl i gyfnodau cyn-hanes fel y gwelwn ar hen safleoedd archeolegol, yn enwedig ar rai ffriddoedd lle na fu aredig i chwalu'r olion yn gyfan gwbl. Yma cewch olion cytiau crynion â rhwydwaith o wrymiau isel o'u cwmpas sy'n dangos lle bu cloddiau crwydrol yn amgáu clytwaith o gaeau bychain.

Bu cryn dipyn o amgáu tiroedd i greu caeau yn digwydd ar wahanol gyfnodau dros y canrifoedd ac yn arbennig yn dilyn cyflwyno Cyfraith Lloegr i Gymru ganol y 16eg ganrif. Yn y ganrif a ddilynodd hynny, ac yn sgîl twf ystadau, cafodd llawer o diroedd comin agored eu hamgáu ar lawr gwlad a chodwyd llawer o gloddiau pridd a cherrig yn ogystal â gwrychoedd.

Fel y tystia Ellis Wynne yn 1703[2], roedd y cau yn golled fawr i'r werin bobl a oedd yn dibynnu llawer ar adnoddau'r comin am danwydd, planhigion defnyddiol a thir pori i ychydig o anifeiliaid a gwyddau:

*Beth yw Taeliwr a ddŵg ddarn o frethyn, wrth Wr mawr a ddŵg allan o'r*

Twm Elias

Clawdd calchfaen, Penfro. Limestone wall, Pembrokeshire

*Mynydd ddarn o Blwy? Oni haeddei hwn ei alw'n Garnlleidr wrth y llall?*

Mae'r mwyafrif o gloddiau cerrig yn yr ucheldir yn dyddio o gyfnod diweddarach - cyfnod y chwyldro amaethyddol ddiwedd y 18fed ganrif a'r 19eg ganrif. Roedd poblogaeth a chyfoeth y wlad yn cynyddu'n gyflym bryd hynny ac roedd hyn yn annog yr ystadau i fuddsoddi'n helaeth mewn gwelliannau amaethyddol er mwyn bwydo'r boblogaeth ddinesig a diwydiannol newydd ac, wrth gwrs, i wneud elw sylweddol yn sgîl y galw cynyddol am fwyd.

Roedd sawl ffordd i gynyddu cynnyrch y tir:

- gwella a draenio tiroedd oedd eisoes ym meddiant yr ystadau.
- ennill a thrin tiroedd newydd o forfeydd y glannau.
- cyflwyno cnydau newydd a dulliau newydd o drin y tir.
- gwella bridiau a dulliau meithrin a bwydo anifeiliaid.
- meddiannu a chau tiroedd comin.

Byddai angen Deddf Seneddol i gau tir comin ac ni allai'r bobl gyffredin, sef y cominwyr, wneud fawr ddim i atal hynny. Unwaith i gais gael ei wneud gan dirfeddianwyr cefnog i gau tir comin dan Ddeddf Seneddol gallent ddibynnu ar holl rym y gyfraith a'r milisia lleol i'w cefnogi. Tynged y rhai a wrthwynebai, yn aml, oedd alltudiaeth i Botany Bay, Awstralia.

Ceir gwahaniaeth rhwng De a Gogledd Cymru yn nifer y Deddfau Cau a basiwyd yn y cyfnod hwn[3]:

| | Gog. Cymru | De Cymru |
|---|---|---|
| 1700 – 1760 | 3 | 0 |
| 1761 – 1801 | 20 | 6 |
| 1802 – 1811 | 32 | 14 |
| 1812 – 1844 | 24 | 30 |
| 1845 – 1885 | 22 | 83 |

Gwelwn mai anterth y cau yng Ngogledd Cymru oedd cyfnod Rhyfel Napoleon pan gafodd y tirfeddianwyr esgus perffaith i gau tiroedd ar y sail bod angen cynhyrchu mwy o fwyd i frwydro yn erbyn y Ffrancwyr. Yn y de a'r canolbarth gwelwn mai canol y 19eg ganrif oedd y cyfnod prysuraf.

Ond man cychwyn, yn aml, oedd y cau. Rhan bwysig o gynllun yr ystâd fyddai uno nifer o fân ddaliadau amaethyddol i greu daliadau mwy a chyplysu darn o fynydd, oedd gynt yn gomin, â phob daliad fel eu bod yn cynnwys tir gwaelod i dyfu cnydau a phesgi anifeiliaid; tir ffridd i wartheg a thir mynydd i gadw defaid dros yr haf. Cymhelliad cryf dros feddiannu'r tiroedd comin oedd creu'r gallu i gynyddu niferoedd y defaid ar yr ucheldir yn sylweddol iawn, er mwyn cyflenwi anghenion y diwydiant gwlân oedd ar dŵf yn y cyfnod hwn. Gallwn dybio bod codi miloedd o filltiroedd o gloddiau cerrig ar y mynydd-dir, ynghyd â phori degau o filoedd o ddefaid yn hytrach na'r niferoedd llawer llai o ddefaid, gwartheg a geifr oedd yma cynt, wedi cael effaith nid ansylweddol ar ecoleg a chynefinoedd ucheldiroedd Cymru.

Mewn sawl ardal mae 'na goel mai carcharorion rhyfel o Ffrainc neu, yn fwy na thebyg, cyn-filwyr yn dilyn Rhyfel Napoleon a'u cododd, e.e. y Carneddau, Bannau Brycheiniog. Mewn rhai ardaloedd eraill credir mai Gwyddelod oedd wedi gorfod ffoi rhag y newyn mawr ddilynodd y clwy tatws yn 1845 oedd yn gyfrifol am godi waliau niferus yng nghanol y 19eg G.

Arhosodd llawer o'r 'ffermydd teuluol' newydd a grëwyd yn y cyfnod hwn, ynghyd â phatrwm sylfaenol eu dull o ffermio cymysg, yn weddol ddigyfnewid hyd at y 1970au.

## Daeareg ac adeiladwaith y cloddiau

(John H Davies, cyn-ddaearegwr CCGC)

Mae ffiniau caeau a thir mynydd fel arfer yn adlewyrchu natur y tir a'r creigiau y maent yn sefyll arnynt. Os oes creigiau caled yn brigo i'r wyneb, fel yn Eryri, Bannau Brycheiniog a'r Preselau, yna waliau cerrig welir yn fwyaf cyffredin. Ond os yw'r creigiau yn feddal ac yn chwalu'n rhy hawdd, neu wedi eu gorchuddio dan drwch o bridd, yna mae'n haws gosod un ai perthi neu wrychoedd sy'n tyfu'n syth o'r ddaear neu gloddiau pridd wedi eu wynebu â cherrig gyda gwrych neu ffens weiren ar hyd eu pennau.

Wrth deithio o un pen i'r wlad i'r llall, mae'r gwahaniaethau hyn i'w gweld yn amlwg iawn. Ynghyd â ffurfiau'r adeiladau traddodiadol sydd hefyd wedi eu codi o ddefnyddiau lleol maen nhw'n rhoi cymeriad arbennig i bob ardal. Er enghraifft, gwrychoedd a chloddiau pridd a welwn yn bennaf yn nhirlun meddal y Siroedd dwyreiniol a'r canolbarth (creigiau Silwraidd); cloddiau cerrig cywrain sy'n fwyaf amlwg yn nhirlun y tywodfaen coch ym Mrycheiniog a Gwent ac ar galchfaen Morgannwg a Gŵyr; cloddiau pridd a cherrig a geir ar waddodion rhewlifol Llŷn, Ceredigion, Penfro a Sir Gâr a chrawiau llechi sy'n nodweddu rhai o derfynau ardaloedd chwarelyddol Gwynedd.

Ar ben hyn, o fewn pob ardal fe gewch amrywiaethau yn adlewyrchu cymhlethdod y creigiau lleol a'r gwahaniaethau yn arddull draddodiadol y crefftwyr a'u cododd.

Yn sicr, Eryri yw'r lle i fynd i weld amrywiaeth enfawr ymhlith cloddiau ardal; maen nhw'n adlewyrchu cymhlethdod daearegol yr ardal - yn gymysgedd o lechfeini a chreigiau igneaidd hynafol, gyda phob un yn rhoi cymeriad arbennig i glawdd. Ar ben hynny mae sgiliau'r rhai a'u cododd, weithiau ar lethrau creigiog anhylaw yn rhywbeth i'w ryfeddu ato. Mae ardal Bannau Brycheiniog wedyn yn cynnig cyfle i weld adeiladwaith cloddiau cerrig ar ei fwyaf cywrain, am fod natur y tywodfaen coch yno yn rhoi blociau hir-sgwar sydd yn llawer mwy hwylus fel deunydd codi cloddiau cerrig.

Nid yw'r cerrig bob amser yn hawdd i'w trin, yn enwedig y cerrig igneaidd a gododd o berfedd llosgfynydd rhwng 440 – 700 miliwn o flynyddoedd yn ôl. Mae'r rhain yn bob siâp a maint ac yn anodd i'w gosod yn daclus, yn wahanol iawn i lechfeini neu flociau o gerrig gwaddod.

Gall cloddiau cerrig ddweud llawer am natur y graig leol. Go brin y byddai'r contractwyr gwreiddiol rhyw ganrif a hanner neu ddwy ganrif yn ôl yn trafferthu i gario cerrig o bell – ddim mwy na rhyw ychydig lathenni. Dyma pam y bydd mapwyr daearegwyr, mewn rhai ardaloedd, yn chwilio am gliwiau am yr hyn sydd o dan yr wyneb drwy edrych ar dystiolaeth y cloddiau cerrig. Gall newidiadau bychain o ran ffurf y tir, neu fân newidiadau ym maint, siâp, lliw neu ansawdd y cerrig ar hyd y clawdd nodi yn bur fanwl yn aml lle mae newidiadau daearegol yn digwydd.

Twm Elias

Ffens o Crawiau llechi, Cwm Croesor • Slate fencing, Cwm Croesor

Dim ond yn rhai o'r cloddiau cerrig modern ar ochrau ffyrdd y gwelwch chi gerrig dieithr sydd wedi eu cludo o bell. Diffyg cerrig addas yn lleol sy'n cyfri am hynny. Enghraifft dda yw'r cerrig calch du a gludwyd o Fôn gan yr hen Gyngor Gwynedd pan oedd angen

Twm Elias

Llandecwyn, Meirionnydd. Wal gerrig ar lethr yn ardal.
Stone wall on a slope.

lledu rhai ffyrdd yn y 1970au – 80au; gwelir rhain mewn mannau fel Bwlch Llanberis. Nid yw'r cerrig hyn yn gweddu o gwbl i batrwm, lliw na chymeriad cloddiau traddodiadol yn yr ardal hon o Barc Cenedlaethol Eryri ond yn adlewyrchu ffasiwn a chyfleustra eu cyfnod.

Fel arfer, yn yr ardaloedd hynny lle mae creigiau'n brigo i'r wyneb – yn y mynyddoedd neu ar yr arfordir – y ceir cloddiau cerrig, ond fe'u gwelwch hefyd yn yr ardaloedd lle mae'r trwch o waddodion rhewlifol sy'n gorchuddio'r tir yn llawn cerrig crynion gafodd eu treiglo a'u gollwng yno ar ddiwedd Oes yr Iâ. Mae cloddiau arfordir Ardudwy, rhwng Harlech a'r Bermo, yn enghraifft dda iawn o hyn ac yn dangos crefft arbennig y rhai a'u cododd oherwydd nid hawdd yw codi clawdd o gerrig crynion. Mae cymeriad arbennig iawn i'r cloddiau hyn, nid yn unig o ran eu patrwm ond hefyd am eu bod yn eitha trwchus, sy'n hanfodol os yw'r math yma o glawdd am gadw heb chwalu.

## Cloddiau cerrig – yn gysgod a chynefin

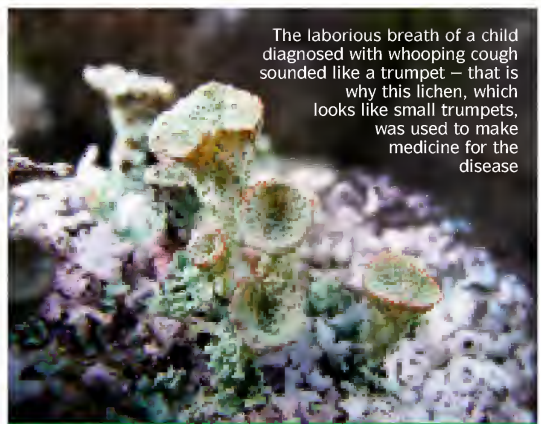
(Dafydd Roberts, Ecolegydd, Parc Cenedlaethol Eryri)

Pwrpas codi cloddiau yn y lle cyntaf oedd i gau tir – mae'r geiriau 'cau' a 'cae' yn tarddu o'r un gwreiddyn. Roedd hel cerrig o groen y ddaear a'u codi'n gloddiau o gwmpas y cae yn amgáu tir y gellid eu drin yn ogystal â chreu ffiniau i gadw anifeiliaid allan, neu i mewn.

Mae codi clawdd cerrig yn creu cynefin ynddo'i hun, neu gyfres o fân gynefinoedd mewn gwirionedd. Maen nhw'n adlewyrchu'r gwahaniaethau rhwng yr ochrau heulog a chysgodol, pen y clawdd a'i waelod, y rhannau yn nannedd neu yng nghysgod y gwynt a hefyd y llenwad mewnol a'r wyneb allanol. Hefyd mae'r pridd dan seiliau'r clawdd yn lloches sychach i fywyd gwyllt ac yn gynefin gwahanol iawn i'r borfa yn y cae neu wrth fôn y clawdd lle bydd defaid yn cysgu neu gysgodi.

Gall hen glawdd cerrig fod yn gynefin eithriadol o gyfoethog i wahanol fathau o gen. Mewn gwirionedd, pan fyddwch yn edrych ar hen glawdd prin y gwelwch chi y cerrig eu hunain ond yn hytrach y croen llwytaidd o gen sy'n eu gorchuddio. Ar un adeg arferai'r tlodion fynd i 'genna', neu gasglu cen a'i werthu i felinau gwlân am geiniog y pwys i liwio gwlân. Erbyn heddiw dim ond brethyn Harris Tweed sy'n dal i gael ei liwio fel hyn.

Mae cloddiau cerrig yn lloches ac yn guddfan i lygod a chwningod a hefyd, wrth gwrs, y creaduriaid eraill sy'n eu hela: gwenci, bronwen, ffwlbart.



The laborious breath of a child diagnosed with whooping cough sounded like a trumpet – that is why this lichen, which looks like small trumpets, was used to make medicine for the disease

Twm Elias

Cwpannau'r pâs *Cladonia pyxidata* Pixie cups. Byddai anadl lafurus plentyn yn diodde o'r pâs yn swnio fel utgorn – dyna pam y defnyddid y cen hwn, sy'n edrych fel trwmpedau bychain, i wneud ffisig at y clwy

Maent yn lleoedd da hefyd, os oes rhostir gerllaw, i wiber neu fadfall gyffredin dorheulo ac os oes tir gwyllt neu gorsiog yn y cyffiniau gellir gweld neidr ddefaid, llyffant neu froga a madfall y dŵr o gwmpas y cloddiau cerrig.

Mae clawdd cerrig ar y mynydd hefyd yn un o hoff leoedd nythu tinwen y garn a chlochdar y cerrig. Ac mae ffriddoedd mewn rhai ardaloedd hefyd yn cynnig cynefin nythu i'r dylluan fach. Ambell flwyddyn gall brân dyddyn nythu ar ben clawdd cerrig.

### Crefft a threftadaeth

Wedi cyfnod o esgeulustod yn hanner olaf yr 20fed ganrif, pan fu i lawer o waliau cerrig ddirywio a bylchu ac i ffensus gael eu gosod yn gyfochrog i gadw anifeiliaid yn eu lle, daeth tro ar fyd. O 1992 ymlaen cynigiwyd grantiau gan gynlluniau amaeth-amgylcheddol Tir Cymen, Tir Gofal (a Glastir erbyn hyn) a hefyd gan gynlluniau arbennig y Parciau Cenedlaethol, fel Tir Mynydd, a hynny er mwyn adfer waliau cerrig traddodiadol. Roedd hyn yn gydnabyddiaeth o bwysigrwydd waliau cerrig yn y tirlun a bod iddynt werth enfawr yn amaethyddol ac i fywyd gwyllt. Er enghraifft, mae llawer mwy o gysgod i anifail y tu ôl i glawdd cerrig nag sydd i'w gael y tu ôl i ffens weiren! Hefyd, mae clawdd cerrig yn llawer mwy cynaladwy na ffens. Dros oes rhai o'n cloddiau cerrig presennol, ac mae rhai ohonynt dros 200 mlynedd oed, mae'n debyg y buasai angen adnewyddu ffens tua 8 gwaith.

Mantais arall y grantiau i adfer waliau cerrig oedd eu bod yn cadw crefft yn fyw gan alluogi sawl waliwr i ennill bywoliaeth ac i addasu ei sgiliau i adfer gwaith cerrig mewn cyswllt archeolegol neu addasu adeiladau traddodiadol at wahanol bwrpasau.

Am fwy o wybodaeth am waliau cerrig a'u patrymau lleol yn Eryri cysylltwch â Carwyn ap Myrddin, Adran Amaeth, APCE, **Carwyn.apmyrddin@eryri-npa.gov.uk**

*Mae **Twm Elias** yn gysylltiedig â nifer o brosiectau amgylcheddol / cymunedol, gan gynnwys Cynefin a Chymuned a Llên Natur. Arferai fod yn ddarlithydd ac yn drefnydd cyrsiau ym Mhlas Tan y Bwlch, Canolfan Astudio Parc Cenedlaethol Eryri.*

Mandy Marsh

Clawdd yn cynnal nifer o rywogaethau ar Ynys Enlli
Bardsey *clawdd* construction supporting many species

**Cyfeiriadau**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## In praise of *cloddiau*

The Welsh word *clawdd* (pl. *cloddiau*) can be variously translated as 'wall', 'bank', 'dyke', earthwork' or 'hedgerow'. Since prehistoric times people have constructed artificial boundaries of all kinds. Many new *cloddiau* were constructed from the 17th century onwards, when landlords began to enclose common land in order to intensify agricultural production. This caused great hardship, denying ordinary people resources such as fuel, useful plants and grazing land. The *cloddiau* typically connected an upland area to lowland holdings in order to further sheep production, and this concentration greatly altered the ecology of these areas.

The geology of Wales dictates the structure of the *cloddiau*, with different styles clearly visible around the country. One common construction is an earthen bank faced with stones and often topped by a hedge or fence. As well as sheltering livestock, this provides good habitat for many species, especially lichens and mosses, small mammals, and nesting upland birds.

Mike Sutcliffe

# Travels in lichenology – a journey into the micro-world

*Cladonia polydactyla*

*Embarking on a new field of study can be difficult but the rewards invariably outweigh the difficulties, as* ***TRACEY LOVERING*** *discovered when she became fascinated by lichens.*

Tracey Lovering

*Baeomyces rufus*

Entering the world of lichenology has felt rather like my first experience of scuba-diving: I marvel that all these wonderful life-forms have co-existed on the same planet all this time without my knowledge! How could I have failed to notice such remarkable cohabitants? The myriad of colours, structures, reproduction strategies and forms, all brought to sharp clarity through a hand lens or microscope, is incredible.

It was the striking appearance of lichens that first drew me in, and has since secured me. Their fascinating lives, and the places in which they thrive, remain a source of inspiration and reflection. It is quite something to think that lichens only begin if a fungal spore meets its right algal or cyano-bacterial partner, and then only if this is in a particular environmental niche which suits its colonisation – though there are singular exceptions that won't take their individual chances, but instead muscle in on other lichens to use their algal partner rather than find their own. A lichen's choice of substrate is often bizarre[1], and

can include glass, metal (including abandoned cars – vehiculicolous lichens!), plastic rope and decayed cloth (fabricolous lichens!).

## Local finds

When first dabbling in the world of lichenology, looking at wayside trees with only a hand lens and Dobson[2] for company, I spotted an attractive grey foliose species (centrally attached to the bark but with free lobes) on an ash tree. It held a number of chocolate brown apothecia (reproductive structures) suspended above its body, on a mattress of black hair-like rhizines. It had to be something special, looking this strange – I had inadvertently stumbled upon a Nationally Scarce, nutrient-rich, dry bark speciality *Parmelina carporrhizans*. Another time, stopping to absorb the view when part way up Foel Fawr, above Eglwys Fach, led to the discovery of *Degelia atlantica*, a localised Atlantic oceanic beauty, on the flushed rock face behind me.

What made both of these discoveries resonate was that they were uncovered while exploring my local area. The local *ffridd*-clothed hills, scattered hard outcrops, deep tumbling wooded valleys, wide swathe of quiet estuary, and old, walled meandering tracks were not only deeply important to me, but of huge importance to those unique species which had also made their home here.

## Local study

Having embarked on a distance-learning MSc while working for the Countryside Council for Wales, with a babe in arms and toddler at my feet, it seemed only sensible to concentrate my faltering first studies locally, where I could nip out on foot to complete a couple of hours of recording at a time.

Coed Cwm Einion is one of four local oceanic ancient wooded valleys: I focused on recording all species occurring on 20 wayside trees scattered across the sheep-grazed valley sides, and a further 20 trees in the wood itself. I was a constant source of amusement for Mr Jenkins who farmed the land I surveyed – he would pass me on his way up hill and we'd call out a greeting, then an hour later he'd pass me on his way down, only to find me still stuck to the same tree. I'd like to say that my recording skills

F G Jones

The aptly named *Lasalia pustulata*

are now so honed that spending an hour on a single tree is behind me; however this is not always the case, as friends will testify. The trouble is that once you start looking and noticing the interesting small species, you're often drawn into the tinier, quirky, tricky ones. Within the microcosm of your hand lens, multi-limbed inhabitants often startle you, revealed in glorious detail, bumbling around scouting for food (commonly lichens) or prospective mates.

In any new field it is a challenge to get to grips with species names, terminology, features to look for, and confusion over similarities and irregularities. This is perhaps especially true of lichens, with few common English or Welsh names help you out. However, the more you record, the more familiar the names become. They are often highly descriptive, such as *Lasallia pustulata*, bringing pustules and boils to mind!

Developing a reference herbarium is useful, as long as any collection is minimal and from a viable population that is not of conservation concern. Specimens must be dried and stored carefully in a well labelled paper herbarium packet. Freezing the packet in a sealed plastic bag overnight will kill any invertebrates that may go on munching otherwise! Microscope examination is essential to determine many species, but patience and a steady hand are rewarded by the finer details revealed. Many species, however, can be determined in the field based on field characters, the habitat and niche occupied, and by using keys and chemical spot tests where required.

Tracey Lovering

*Ochrolechia frigida*

## No need to go it alone

I was very fortunate to have local support from lichenologist Steve Chambers, who was able to confirm or correct my identifications – often noting additional species on the specimens of bark I had sent to him – and to help with ones that I struggled with. My hours spent recording yielded a further 41 records to the site-list of 160 species originally recorded by Steve Chambers and Francis Rose. These included an additional seven Nationally Scarce species; *Arthothelium ruanum, Bacidia saxenii, Halecania viridescens, Lauderlindsaya acroglypta, Lecania chlorotiza, Parmelinopsis horrescens* and *Phyllopsora rosei,* and some species of conservation importance; *Sticta fuliginosa, Cetrelia olivetorum s. lat, Leptogium cyanescens, Pannaria conoplea, Parmeliella parvula* and *Parmotrema crinitum*.

I was also lucky to have the friendship and support of Pat Wolseley[3], who gave her time and expertise in reading and commenting on my dissertation and gave me *The Lichens of Great Britain and Ireland*[4]. It was Pat who first introduced me to lichens on her 'Botanising in Pembrokeshire' FSC course, in the form of *Roccella* growing on the walls of St David's Cathedral. It was only later that I felt inexplicably drawn away from vascular plants towards lichens. I remember feeling daunted at the perceived difficulties and had no doubt it would be a tricky route to take, but I couldn't resist how beautiful, unknown and strange they were. Perhaps the challenge was part of the draw?

The support, friendship and company of the informal Welsh Lichen Recording Group has also been invaluable. It took a while for me to feel that I could join this specialist group, acutely aware of the chasm between their expertise and my tentative beginnings, but the group welcomed me warmly and had endless patience and humour. We met for day field meetings but also ventured on extended memorable field-trips to the Llŷn peninsula and Ardtornish, at the head of Loch Aline in Western Scotland. On the Llŷn we explored coastal heath, hard and soft cliffs, the pebbles of Trevor, churchyards, and in and around Nant Gwrtheyrn, our base camp. Highlights for me were finding *Lobaria amplissima*, *Heterodermia leucomela* and *Teloschistes flavicans*. Our time at Ardtornish was luxurious, both for the food, wine and fires inside (in an enormous mansion on the edge of Loch Aline)

Mike Sutcliffe

*Pannaria canoplea*

Tracey Lovering

Terrestrial coral reef

Neil Sanderson

*Heterodermia leucomela*

and for the drapes of luxuriating fertile *Lobarion* community outside, much admired by us all.

British Lichen Society field meetings in Scotland, the Isle of Man and Snowdonia have given me opportunities to learn from and consult others with more experience. They have also given me the confidence to look at less familiar habitats and micro-niches, with experts to hand. Meetings are always memorable and decidedly quirky, and come highly recommended! Further meetings have been arranged in 2016 for Northumberland, Isle of Wight, Isle of Skye, and the North York Moors.

## Moving on

In May 2015, as a member of the UK Technical Advisory Group on Wood-Pasture & Parkland, I took part in a study trip to Transylvania, Romania. We visited and learned from a number of extensively managed herb-rich wood pasture sites, grazed by shepherded mixed community herds of horses, sheep, goats, cattle and buffalo! I provided input on the nitrophilous dry bark lichen community associated with these grazing systems, and recorded species associated with conditions of ecological continuity in Britain[5]. One specimen collected was identified by Steve Chambers as *Melanelixia subargentifera*, recorded from only one tree in the UK!

## Support for beginners

The prospective lichenologist need not feel so daunted now, as there are many resources available for beginners and intermediates alike. In 2015 I took the plunge and agreed to provide a beginners' lichen course for SEWBREC (South East Wales Biodiversity Records Centre). It felt good to support others taking their first steps on a journey into the micro-world. The Field Studies Council also runs training courses, and support is at hand through the British Lichen Society. The Lichens of Wales website[6], developed by Alan Hale, is an excellent resource packed with information, photos, species accounts, the Welsh Lichen Red Data List, and Section 42 species (of priority conservation concern/importance in Wales). If you remain unconvinced of the beauty and intricacy of these species, the photos on this website will persuade you otherwise.

## LASW

In 2009, Welsh Government, through Wales Biodiversity Partnership, funded a Lichen Apprenticeship Scheme for Wales (LASW), acknowledging the deficit in lichen specialists and knowledge in the country. I was fortunate to join others on this scheme at the time, which provided further opportunities to learn alongside experts.

Tracey Lovering

Golden hair lichen *Teleschistes flavicans*

In spring 2016 Plantlife Cymru will build on the experience of LASW and launch a new Lichen Apprenticeship Scheme. It will focus on lichens of woodland and wayside trees, and is a great opportunity for those new to lichens to dip their toes in and discover a new interest, with the option to become fully submerged! I am very pleased to have joined Plantlife's team in December 2015, and am looking forward to supporting new lichenologists and also to resurrecting the Wales Lichen Recording Group for intermediates and specialists.

If the Scheme is successful in introducing apprentices to the smaller species in their local environment, it will be a great achievement. Familiarity with species and communities nudges a growing awareness of how very special these places are, how sensitive the species are, and of the stories they tell us of the history of the locality and human past and current influence. We need to notice and care for these places to ensure long term protection, and to ensure our activities (local and national) are not the cause of their decline and loss. Our understanding of the requirements, status and distribution of Welsh species will be greatly improved into the bargain, providing much needed evidence to inform our local and strategic management and policy decisions.

I hope that this article will spark interest in readers to always have a lens to hand and to enter the micro world of lichens when out and about, and will encourage any hesitant future lichenologist to apply to the Apprenticeship Scheme. Details will be made available shortly on the Plantlife website[7], but I am happy to receive initial interest through email.

**Acknowledgments**

I am indebted to the Welsh Lichen Recording Group – Steve Chambers, Ray Woods and Alan Orange, Joy Ricketts, Pat Wolseley and others in BLS.

*After 15 years with the Countryside Council for Wales and then Natural Resources Wales & Wales Biodiversity Partnership,* ***Tracey Lovering*** *is currently Plantlife Cymru PLinC & Lower Plants & Fungi Officer.* ***Tracey.Lovering@plantlife.org.uk***

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6. www.wales-lichens.org.uk

## Taith i fyd cenneg

Mae'n anodd cychwyn ar faes astudio newydd, ond gall cwmni a chymorth gan arbenigwyr sydd eisioes yn gweithio yn y maes yn ogystal â brwdfrydedd am y pwnc ei hun fod yn help mawr. Denwyd Tracey Lovering at harddwch egsotig cennau drwy ficrocosm lens llaw. Pan sylweddolodd fod rhywogaethau prin a chyffrous o fewn tafliad carreg i'w chartref, dechreuodd gynnal arolwg systematig o 40 o goed lleol ac ychwanegwyd 41 cofnod i'r rhestr safleoedd wreiddiol o 160 o rywogaethau. Roedd angen dysgu llawer o Ladin, gan mai prin yw'r rhywogaethau sydd ag enwau cyffredin! Daeth rhai'n gyfarwydd yn y maes, ond dim ond trwy ficrosgop y gellir adnabod eraill. Ers y dyddiau cynnar hynny, a llawer iawn o deithiau maes, mae hi wedi symud ymlaen i fod yn Swyddog Planhigion Is a Ffyngau gyda Plantlife. Yn 2016, bydd Plantlife yn atgyfodi'r Cynllun Prentisiaeth Cen a ddechreuwyd gan Lywodraeth Cymru yn 2009, er mwyn annog pobl newydd i ddysgu am y rhywogaethau diddorol hyn.

All photos Andy Woolmer

# Clocks, cultch and spat: native oyster restoration in Wales

*As filter feeders, oysters are instrumental in maintaining good water quality by sifting phytoplankton and sediment from the water column, but a combination of over-fishing and pollution has drastically reduced numbers of native oysters around Wales. Water quality and dependant species have suffered as a result.* ***ANDY WOOLMER*** *is at the forefront of a scheme to bring back oysters to Swansea Bay.*

Native oyster *Ostrea edulis* Llymarch

If you order half a dozen oysters in a restaurant or see them on the fishmonger's slab you will almost certainly be presented with a selection of Pacific oysters *Crassostrea gigas* rather than our own native oyster *Ostrea edulis*. In fact, native oysters make a rare appearance on menus these days but it was not always the case.

Oyster fisheries in Britain stretch back to Roman times, when it was much valued; "Poor Britons," commented Roman historian Sallust in AD 50, "there is some good in them after all – they produce an oyster". In the Middle Ages it was consumed on 'fish days' – Lent and all Fridays and Saturdays were observed as such until the late Middle Ages, and Wednesdays until the early 15th Century. Oysters continued to be a regular part of British cuisine, consumed either pickled or fresh, baked in pies, or as a stuffing for meat and game, until the late 1800s.

## Decline of the native

Until the mid-late 1800s the native or flat oyster was widely distributed

in European waters. Olsen's beautifully drawn *Piscatorial Atlas of the North Sea, English and St. George's Channels* (1883) shows oyster banks and beds around all British coasts and extensive beds across the southern North Sea.

The decline of the native oyster began after the Napoleonic wars, when the advent of the railways provided speedy links from coastal communities to growing industrialised cities and their markets. Large oyster fisheries developed and supported coastal communities like Oystermouth in Swansea Bay, where 188 sail-driven skiffs employed 580 fishermen. This boom fishery peaked around 1850-1860, with annual estimates of 500 million British oysters being sold through Billingsgate market alone. The first official figures produced in 1886 offer a stark contrast to this, with only 40 million oysters being recorded. The introduction of locally enforced minimum sizes, usually 2¼ inches, was too little too late, and the intense fishing effort ultimately did for the fishery. By the late 1800s oyster-dependent communities were in crisis; there were soup kitchens at Oystermouth to support destitute families in 1875.

The Industrial Revolution had another, unseen, effect on the native oyster. Industrial pollution and degradation of the rivers, estuaries and coasts added further pressures on the already vulnerable populations. Heavy metals such as copper and cadmium can inhibit the oyster immune system. More recently other compounds, notably tri-butyl tin, can affect reproductive function. This was very much a case of kicking the oyster while it was down.

The distribution of native oyster beds from Olsen's 1883 Piscatorial Atlas

Probably the nail in the coffin around Europe, including here in Wales, was a widespread oyster disease, later considered to be caused by the flagellate protozoan *Hexamita*, which was responsible for mass mortalities in practically all European oyster populations in 1920 and 1921.

### The loss of a keystone species

Beyond the obvious loss and impact on historic inshore fisheries and communities, the collapse and non-recovery of the native oyster population has reduced the ecosystem function of our estuarine and coastal environment. The native oyster has the ability, through its everyday process of filter feeding, to remove significant amounts of nitrate and phosphate from a water body by feeding on phytoplankton. For our estuaries and coastal seas this is a vitally important service, especially as many areas are considered to suffer from eutrophication. This service is further enhanced by aerobic bacterial cycling within the fabric of the oyster bed, akin to the process in a sewerage treatment farm.

**Native oyster 'good and services'**

- In the 4 years that it takes a single oyster to reach a market size of 70g it will have sequestered between 0.5-1.0g of nitrogen into its tissues
- At the scale of an estuary, an oyster bed can remove the annual nitrogen input of a sewage treatment plant (500 tonnes of oysters will remove 3.5-7.1 tonnes of nitrogen)
- A single adult native oyster filters up to 200 litres of seawater per day: over 5 years this equates to 0.365 million litres
- It has been calculated that a 1ha oyster bed is able to remove over 7.5 tonnes of suspended sediment every 10 days

Oysters are also able to remove large quantities of suspended material from the water column, and their ability to reduce the turbidity of sea water is well documented. This service in cleaning coastal waters and estuaries has been lost and it has been suggested that this is linked to the loss of other important species such as seagrasses that depend on water clarity to thrive.

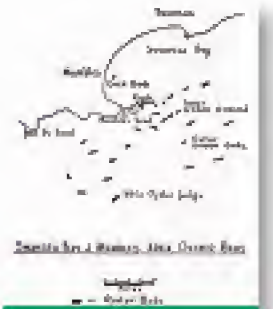
Even in a degraded state, oyster beds can be structurally complex biogenic habitats made up of live and dead shells, known colloquially as 'cultch', which trap sediment and detritus. Oyster beds and associated fauna can play a defining role in nutrient cycling, taking food from the water column and transporting it into the sediments where it supports invertebrates at the base of coastal food webs. These biogenic habitats provide vital settlement habitats and refuges for a diverse range of species. Elsewhere in the world similar habitats are hot spots for marine biodiversity and important nursery areas for commercial species such as bass and juvenile lobsters.

Since the oyster's decline and the degradation of its supporting habitats we no longer have these services. All is not lost, however; we are attempting to bring the native oyster back in Swansea Bay.

## The Mumbles Oyster Company's restoration efforts

The Mumbles Oyster Company Ltd. was formed with the express intention of restoring the native oyster to Mumbles and Oystermouth. Spurred by the lack of progress in and support for native oyster restoration more widely in the UK, we hit on the concept of 'restoration aquaculture' that could deliver both native oyster restoration benefits and the necessary long-term economic security to sustain these. Traditional grant-based projects typically have a short-term life and are reliant on a constant input of grant aid to continue. Our model relies on sustainable aquaculture production to finance restoration efforts and to provide much needed employment.

Our first step was to secure legal protection for the historic oyster beds off Mumbles. We had previously surveyed historic beds in Swansea Bay with video cameras for the Countryside Council for Wales (CCW) and were informed by historic records and sketch maps produced in the 1920s during interviews with surviving oyster fishermen. One of the beds was located conveniently at the westernmost arm of Swansea Bay about 500m off the end of the pier. We secured a Several Order for a 35 ha site that provides legal protection of the oysters we would cultivate.



Sketch map of historic oyster beds around Swansea Bay, drawn from surviving fishermen's knowledge in the 1920s

Video still of broodstock oysters on the beds at Mumbles

Oyster 'clocks' collected from the Mumbles beds

### Relaying broodstock

Since 2014 we have been working to establish a broodstock bed of large adult native oysters to act as a source of overspill larvae to help recolonise the oyster beds in the Bay and along the Gower coast. These oysters were sourced from Loch Ryan, one of the last remaining wild populations in Europe still unaffected by *Bonamia*, a parasitic disease of native oysters. We relayed 40,000 oysters over the winter of 2013/14 by a not-very-technical process of tipping them over the side of a slow-moving vessel in a distinct broodstock plot within the site.

### Clocks and monitoring

We were subjected to the stormiest winter in 50 years over the period of relaying and there were concerns that the oysters could have been smothered by shifting sands or simply dashed together on the seabed. Our regular video survey and sampling has subsequently shown that the broodstock oysters survived the process very well. During sampling we collect both live oysters and any recently dead ones: the latter are colloquially known as 'clocks', presumably due to the sound that they make when played like castanets.

### Habitat restoration

Oyster spat (the newly settled larvae) need something to settle upon and, whilst they will settle on any hard surface, they really prefer clean shell material. Much of the dead shell cultch on derelict beds has been buried or lost. We decided to redress the balance and trialled some small-scale habitat regeneration by relaying 5 tonnes of clean cockle shell from a local processor.

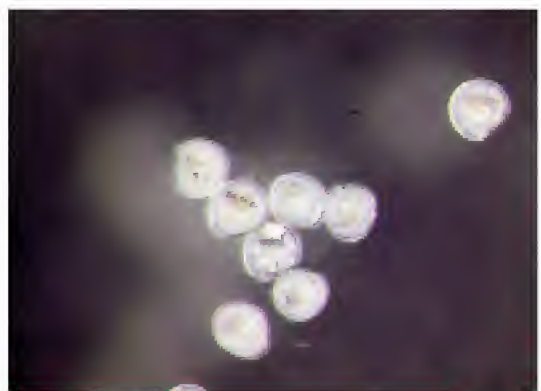
### Brooding oysters and larvae

We were encouraged to find that a proportion of the broodstock oysters were brooding larvae by summer 2014. Analysis showed that there were successive spawnings throughout the summer, and 6% of the population were brooding larvae at any one time. This is well within estimates for a normal population's reproductive state in any year. It may take 3-5 years for the recruits to become sexually mature and reproduce themselves; even then, there needs to be enough of them in close proximity to make this possible. We consider this as a tipping point for our restoration efforts after which recruitment will increase exponentially. Until then there needs to be a continued production and recruitment of spat each season from the broodstock bed.

### The numbers game

So just how many spat can 40,000 oysters produce each season? Each broodstock adult oyster in its female phase (native oysters change sex continually), weighing around 100g, is able to produce around 1.5 million larvae. Assuming a normal sex ratio of 1:1, then we have 20,000 broodstock oyster able to spawn each year. That equates to an astounding 30 billion larvae or potential spat each year.

Unfortunately oyster larvae are subject to predation by other plankton and fish, and being transported away from suitable habitats. It is commonly assumed



Native oyster larvae from Mumbles broodstock 2014

that only a small proportion (around 0.1%) of any larvae released from the broodstock will successfully settle out on to the seabed. However, a small proportion of a very large number is still a large number: 0.1% of 30 billion is 30 million spat on the seabed!

### Signs of success

We had deployed a number of spat collectors around Swansea Bay but other than a rich variety of invertebrate species we did not record any native oyster spat and neither did our search of cultch samples either. Help then came from an unexpected direction. Nigel Sanders, skipper of a local fishing vessel *Danny Buoy*, told us that his crew, while fishing, were finding oysters attached to live whelks, *Buccinum undatum*. This is not a one-off occurrence, as they have continued to record and photograph them for me. We consider this to be the first sign of success as this had not been observed by local fishermen prior to our establishment of our broodstock bed.

### Ranching and the future

Even this short trial has proved that the concept of restoring native oysters is possible but we now need to secure the efforts for the future. Our next objective was to 'ranch' oysters on the site by first relaying small seed oysters, then managing pests and optimising densities to allow them to grow to a marketable size. Unfortunately our supplier of small oysters was hit by the parasitic disease *Bonamia* and that makes the source untenable for us as one of the last disease-free sites in the UK.

Without a secure source of disease-free seed oysters 'restoration aquaculture' initiatives are very much limited to relaying adult broodstock. To address this bottleneck we are developing plans for an oyster hatchery, and trialling cost-effective new methods for seed production. If we are successful then the future of the native oyster is a lot brighter than it was just a few years ago.

**Further reading**

If you want to establish your own native oyster ranching or restoration operation we have produced a handbook to show you how: **https://goo.gl/7aVs8V**

A native oyster attached to a live whelk

***Andy Woolmer*** *operates an independent marine ecological consultancy based in Pembrokeshire (www.salacia-marine.co.uk).*

## Adfer Wystrys Brodorol

Yn y DU rydym yn gwybod am bysgodfeydd wystrys ers cyfnod y Rhufeiniaid. Galluogodd dyfodiad y rheilffyrdd i gymunedau arfordirol fel Ystumllwynarth ehangu eu masnach ac amcangyfrifir bod miliynau o wystrys yn cael eu bwyta yn ystod y cyfnod hwnnw. Nid oedd hynny'n gynaliadwy. Roedd yn rhaid i wystrys ymdopi â llygredd diwydiannol hefyd, yn ogystal â chlefyd parasitig. Erbyn 1921 roedd poblogaethau wystrys ar hyd a lled Ewrop wedi'u difetha'n llwyr.

Mae wystrys yn amhrisiadwy oherwydd eu gallu i hidlo dŵr ac ailgylchu maetholion, gan alluogi llawer o rywogaethau eraill i oroesi a sicrhau bod gennym aberoedd a moroedd iach.

Dechreuodd y Mumbles Oyster Company ar waith i adfer poblogaethau i Fae Abertawe drwy sefydlu wystrys llawndwf a larfâu mewn gwelyau diffiniedig. Hyd yma mae'r canlyniadau'n addawol, gyda 6% o'r stoc magu'n cynhyrchu larfâu ar unrhyw un adeg. Er gwaethaf colli llawer o larfâu sydd newydd ddeor, amcangyfrifir y bydd 30 miliwn yn ymgartrefu ar wely'r môr i ffurfio cytrefi wystrys unwaith eto.

Organic Research Centre

# The quest for enlightened, wildlife-friendly agriculture - *an interview with Colin Tudge*

***It is clear to most of us that endless economic growth can only be achieved at the expense of an increasingly fragile biosphere. Colin Tudge has been writing about and campaigning for a different approach to the economics and practice of farming for several decades. Here IAN RAPPEL records Colin's thoughts on conventional farming, biodiversity loss and an alternative, enlightened approach to agriculture.***

Alley cropping: barley protected by avenues of fruit trees

The present mass extinction in the UK and globally is driven primarily by conventional industrial agriculture. But what most people describe as 'conventional' agriculture is what Colin Tudge calls 'Neoliberal Industrial' agriculture (NI). The 'neoliberal' element has geared agriculture towards maximisation of profit – a culture of extreme competition where the objective for farmers is to grab the biggest possible market share in the shortest possible time. This objective is encouraged by the UK Government every year through the (pro-Establishment) Oxford Farming Conference. Here, successive UK Secretaries of State for the Department of Environment, Food and Rural Affairs (DEFRA) emphasise the same thing every year. British farmers must produce more, they must compete on the world market. Today they are encouraged to produce more and more beef and pork to sell to the Chinese. Thus, NI agriculture has become all about maximisation of output and maximisation of profit. For humans and the biosphere, that is a fundamentally bad place to start for our food chain. That is not what agriculture is for.

The alternative is 'Enlightened Agriculture' (EA) or 'real farming'. EA is expressly designed to provide good food for everybody without wrecking the rest of the world. Under this alternative moral objective, the kind of farming needed is different in just about every detail – certainly in approach – from neoliberal industrial agriculture. Enlightened Agriculture has three interlinked components: agro-ecology, food sovereignty, and economic democracy. The conclusion drawn from following each of these paths is the need for very diverse and synergistic farming systems in the form of mixed farming. EA also requires that these systems be low input – which means that organic farming should become the default position.

CC-SA 4.0 International

Monocultures; good for strawberries and plastic

This Enlightened Agriculture route offers wider benefits for rural life because it results in farms that are organisationally complex. Such complexity entails the need for farming to be skills-intensive. This does not simply mean labour-intensive but rather increased employment of hands-on, skilled farmworkers. And if you have very complicated skills-intensive enterprises, whatever they are – whether they're farms or anything else – then there is generally little advantage in scaling-up. In this high-skilled environment the farms needed are, on the whole, small to medium size, integrated where necessary at larger scales.

### The bigger, the better?

Neoliberal global and national economies push conventional agriculture in the opposite direction. Firstly, at a crude level, farmers are encouraged to minimise all costs to maximise profit and competitive advantage. Secondly, the low price of oil means that it is always cheaper to do things with big machines and industrial chemistry, than to employ a highly skilled workforce. Thirdly, under neoliberalism, minimum cost often translates as minimum labour costs. This encourages farmers to replace skilled labour with high technology – industrial chemistry on the one hand (herbicides instead of people actually cultivating) and big machinery on the other. These three trends discourage diversity within agriculture: it simply does not pay to be complicated. Machinery, even the agricultural robots that some are encouraging, struggles to deal with complicated, mixed farming systems, so farmers are driven towards a monocultural simplicity. This develops into a vicious cycle. If farmers are using industrial chemistry, buying vast quantities of oil-based farm inputs and using big machines, then the advantage in scaling-up the farm kicks in. 'The bigger, the better' becomes the central mantra of conventional agriculture, a response to simple economies of scale. So, instead of finishing up with small/medium, complex and diverse farms, our food chain is becoming dominated by vast monocultures.

This large scale of operation is exactly what the UK Government wants. As models, the government points to countries like the Ukraine, New Zealand or Brazil, where there are farms bigger than UK counties and, in the case of Brazil, probably even bigger than Wales! The fact that they are considered to be 'efficient' depends on a definition of efficiency in terms of output-per-farmworker. The quest for infinite 'efficiency' on these terms will see farms continue to grow in scale and intensify. But when efficiency is defined in any other terms – in social terms, or in terms of the damage to the biosphere – NI agriculture is disastrous. The more that conventional agriculture depends on industrial chemicals, the greater the damage to biodiversity. This trend can be seen very clearly in the case of neonicotinoids. Government denies the evidence that is before their eyes because they do not want anything to get in the way of their process of neoliberal industrialisation in agriculture.

The impact of conventional agriculture on biodiversity is inherently negative. But beneath all the economics are more fundamental issues too – in particular, our collective moral assumptions over the notion of 'progress' in agriculture. NI agriculture's process of replacing people with machines, and proper husbandry with simple economic formulae, is called 'progress': it should more accurately be seen as a process of dehumanisation, taking human beings with their thoughts and their ideas right out of the picture.

## The agricultural benefits of biodiversity

Attention to healthy, functioning ecosystems and biodiversity addresses all the fundamental requirements of agricultural production. There is an obvious link between biodiversity and pollination of fruit and crops for example. But biodiversity also plays a crucial role in soil fertility and structure. The constant recycling of nutrients within healthy soils depends on the interactions and build-up of bacteria, mycorrhizae and soil mesofauna.

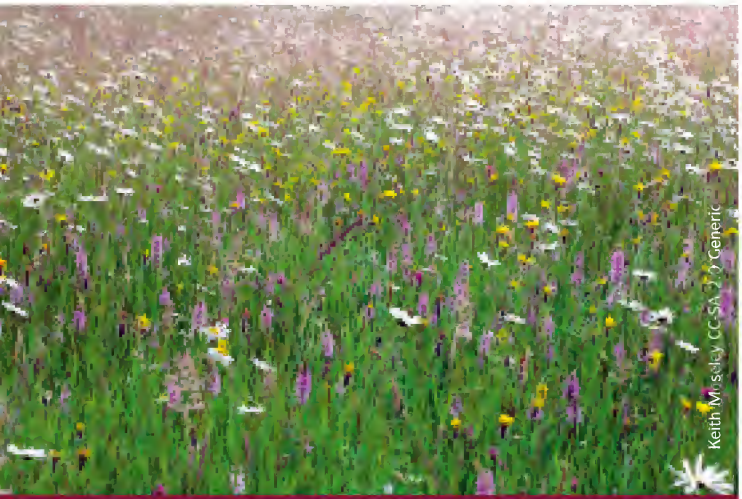
Pest management also benefits from diverse farming practices and associated higher levels of biodiversity. For example, agroforestry trials have demonstrated that trees control pests by providing beetle and

Alley cropping: a mix of vegetables help prevent a build up of pests and diseases

Organic Research Centre

spider banks. These types of positive influences of biodiversity on pest control are demonstrable. Importantly, the greater diversity of crops and livestock on mixed farms also intrinsically deals with pests because it avoids reliance on genetic homogeneity. In a recent case, a Cambridgeshire farmer who planted 6,000 acres of rape complained that flea beetles were devastating his crop. Such farmers will argue that their only hope for profitability is to apply chemical solutions such as neonicotinoids. The UK Government partially rescinded the ban on neonicotinoids because of such cases – but they should have responded by pointing out that growing 6,000 acres of rape as a monoculture is just bad farming.

Diversity on farms contributes to a greater diversity for the wildlife that interacts with us through the farmed environment. At a broader scale, it is only possible to farm well if the whole biosphere is being looked after. The more that intensive farming trashes the biosphere, the more farmers are finding themselves working within a sterile soil environment. As concern has grown over conventional



Pentwyn Farm, a Gwent Wildlife Trust Reserve: how fields used to look before intensive agriculture and monocultures

agriculture's impact on soil ecology, there has been growing recognition of the importance of soil biota. Eve Balfour, who founded the Soil Association in the 1940s, talked about the absolute necessity of having good soil, basing her ideas on Albert Howard's work on soil microbiology and composting. Balfour was written off at the time as a crazy person, but 2015 was International Year of the Soil and her ideas are proving more relevant than ever. The things that Balfour was talking about – soil microbiota, and the links between biodiversity and soil carbon – are key to so many farming problems.

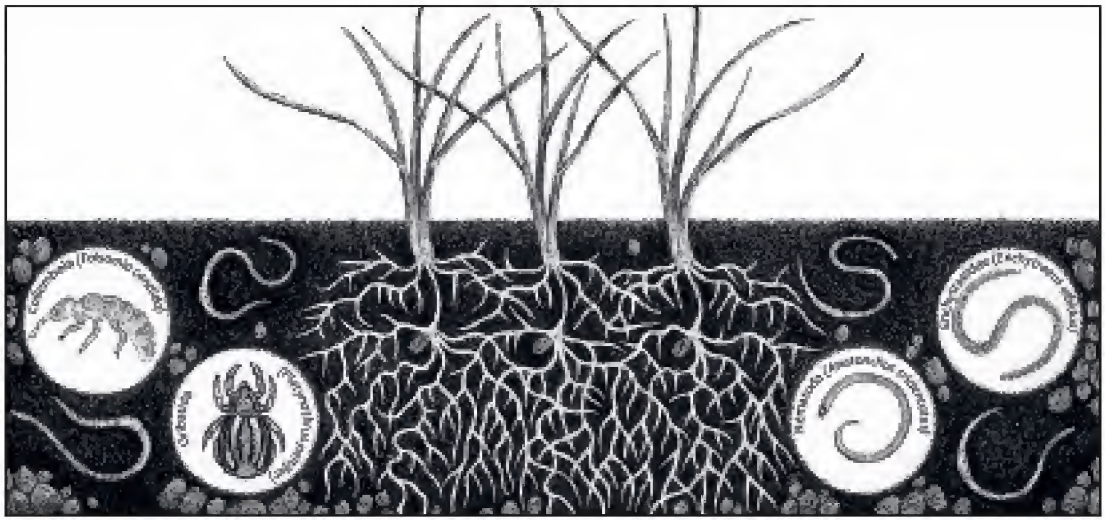
### Rewilding and Enlightened Agriculture

The resurgent interest in 'rewilding' – encouraged by George Monbiot's book *Feral* – has generated much debate, especially in the case of Wales. Monbiot's frustrations with upland farming were interpreted as anti-farming but the concept of rewilding need not conflict with 'enlightened agriculture'.

The rewilding topic which attracts the most attention is the reintroduction of big carnivores. Reintroducing the northern lynx would probably have very little impact on farming because on the whole they do not prey on big livestock, and they are unlikely to attack humans. But there are things that can be done to compensate where livestock loss occurs. In India, for instance, farmers lose livestock to carnivores such as tigers, and entire crops to herbivores such as elephants. So there are farmers who we could talk to about this issue. The key point is that farmers should be adequately compensated.

Wolves, in contrast, are probably not suitable for Wales. In northern Scotland they could be reintroduced because these areas are more agriculturally marginal. Wolves in Scotland would influence the development of an ecologically 'better' deer population. Resistance to carnivore reintroductions in rewilding stems from old ideas of conservation that focused on an ecological hierarchy of vegetation, then herbivores, then the carnivores. But today we understand that a functioning ecosystem depends on keystone carnivores because they determine how herbivores behave. Regarding herbivores, beavers are already being reintroduced. And we've seen successful reintroduction of raptors such as the white-tailed eagle. So reintroduction of keystone species is not that difficult.

There is a point of intersection between Enlightened Agriculture and rewilding. If the objective for farming in Britain is that it is truly sustainable then one of the approaches that is most promising is agroforestry. The example of Professor Martin Wolfe's work at Wakelyn's Farm in Suffolk is an inspiring experiment in agroforestry. Wolfe makes extensive use of alley cropping – planting widely spaced rows of different types of trees including hardwoods, willows, fruit trees and nut trees, with a companion crop grown in the alleyways between. The crops actually grow better in this situation than in open fields because they are protected from weather extremes and the trees help recycle nutrients. It might be possible to graze livestock within the alleys too. Agroforestry and alley cropping in particular would suit most of Britain. Martin Wolfe concludes that all agriculture should be conceived as an exercise in agroforestry. Indeed, a proper system of agroforestry would be easy to reconcile with George Monbiot's approach towards rewilding. Monbiot argues for more trees in the uplands but agroforestry avoids the more misanthropic elements



Nicholas Carter

of his approach: agroforestry means that, where ecologically suitable, we do not have to reforest the uplands and kick out all the farmers and livestock from the landscape. If we can establish agroforestry as the norm within the UK then we can achieve 70% of the rewilding advocated by Monbiot and others.

At this time, when neoliberal economics is dominant, it would be very hard for farmers to make a living through enlightened enterprises such as agroforestry. The economy makes it very difficult for a farmer to make a living by farming in enlightened ways – ways that are good for the environment and ways that, in the end, are actually good for people. Today it is far easier to make a living by cutting ecological corners and maximising output in the short term. If Enlightened Agriculture or agroforestry is uneconomic, then we need to argue that there is something wrong with the economy. The benefits of Enlightened Agriculture would be huge, not least because it is intrinsically wildlife-friendly.

*Colin Tudge is a biologist, science writer and author. Together with his wife, fellow researcher and activist Ruth West, he started the Campaign for Real Farming website in 2008 (www.campaignforrealfarming.org). The Campaign has since given rise to the annual Oxford Real Farming Conference and the College for Enlightened Agriculture and Food Culture. His most recent book,* Six Steps Back to the Land*, is a personal manifesto for agricultural renewal and a guide for those seeking to take up 'enlightened farming'.*

***Ian Rappel** is Chief Executive, Gwent Wildlife Trust.*

## Amaethyddiaeth oleuedig

Yn y cyfweliad hwn mae Colin Tudge yn egluro ei safbwynt ynglŷn ag amaethyddiaeth gonfensiynol ac yn cynnig dewis amgen goleuedig. Mae polisïau Llywodraethau'n barnu llwyddiant ym maes ffermio yn ôl y cynnyrch, y twf a'r elw mwyaf. Maen nhw'n annog ffermwyr i leihau costau trwy ddefnyddio peiriannau a chemegau yn hytrach na gweithlu medrus. Mae'r dulliau hyn yn addas ar gyfer symlrwydd ffermio ungnwd ar raddfa fawr ac yn drychinebus ar gyfer bioamrywiaeth. Mae'r pridd yn cael ei ddiraddio a phlâu yn datblygu imiwnedd i blaladdwyr.

Nod 'Amaethyddiaeth Oleuedig' yw darparu bwyd da i bawb heb ddinistrio gweddill y byd. Amaeth-goedwigaeth yw un o'r dulliau mwyaf addawol, sy'n cyfuno cynigion diweddar ar gyfer 'ailwylltio' (gan ganiatáu i'r dirwedd ymddwyn mewn ffordd fwy naturiol) a 'chnydio stribed', lle mae coed a chnydau'n cael eu plannu mewn stribedi cul, er budd y naill a'r llall. Mae bioamrywiaeth yn hollbwysig ar gyfer ffrwythlondeb a strwythur y pridd. Mae treialon wedi profi bod coed yn rheoli plâu trwy ddarparu banciau chwilod a chorynnod, ac yn helpu i ailgylchu maetholion.

# Skokholm & Skomer 1946

## *An exceedingly busy year*

Joan Keighley Collection

Pat Higginson, standing, was in charge of supplies for both islands.

***DAVID SAUNDERS** reports on the pioneering work carried out 70 years ago on the islands of Skokholm and Skomer.*

In July 1945 Dr, later Sir Julian Huxley F.R.S., speaking at the 7th Annual General Meeting of the Pembrokeshire Bird Protection Society, urged that the Society should become adventurous and enterprising especially with regard to the Pembrokeshire islands. This organisation was soon to become the West Wales Field Society and much later, following several changes of name, the Wildlife Trust of South & West Wales.

Adventurous and enterprising the Society certainly was. The following spring, barely eight months after the end of the Second World War, Skokholm Bird Observatory re-opened. A Field Centre, the first in Britain (if only by a month) was also established on Skomer, by courtesy of the owner Walter Sturt. It operated until 27th October 1946.

One key to the successful operations on both islands was supply officer Patricia Higginson, a former Wren and later the wife of the longest serving Skokholm Bird Observatory warden, Peter Conder, subsequently

Director of the RSPB. She was based at Skokholm Lodge, high above the beach at Martin's Haven, where there is now a Wildlife Trust information centre, known as Lockley Lodge. From here supplies, many still the subject of wartime rationing, reached the islands. Visitors brought their ration books, and coupons were required for petrol and diesel fuel.

Accommodation was available on Skokholm for eight visitors and on Skomer for 12 visitors, at the cost of £3 3s 0d (£3.15) a week. For less than seven days the charge was 10s (50p) a day, while for non-members of the West Wales Field Society an entrance fee of 10s 6d (52.5p) was payable. Visitors were transported to and from Haverfordwest railway station, and accommodated at the Lodge when weather conditions prevented crossings to the islands.

The island boat, loaned by a generous benefactor, was the yacht *Shearwater*, which, despite the name, was not the most suitable craft for the work required. Her skipper Syd Thomas was assisted by Leader Hawkins, known to everyone as Ben, who subsequently had a distinguished career on both stage and screen. The dinghy used was named *Pipit* while Ronald Lockley's *Storm Petrel*, complete with outboard engine, was also pressed into service as required. Most prominently of all, it was used in late March to transport a tractor to Skomer for the first time. This was used, as is the island tractor today, for moving luggage and supplies, not for farming.

Joan Keighly collection

Artist Charles Tunnicliffe and his wife Winifred on Skomer

John Fursdon Collection

The boat laden with furniture for the re-opened Bird Observatory on Skokholm

Caroline, a Welsh Black cow, was sent to Skokholm to provide milk. Her favourite food was sea campion *Silene uniflora*, and she 'assisted' in all outdoor activities, including nocturnal Manx shearwater ringing, and was much taken with the wildlife artist Charles Tunnicliffe as he sat sketching. Both Caroline and Percy the island pig, whose purpose was to dispose of household waste, passed into the care of the lighthouse keepers at the end of the season.

In addition to Charles Tunnicliffe, a number of other distinguished naturalists visited one or both islands during 1946. Among them were W.B. Alexander, Edwin Cohen, C.A. Gibson-Hill, L. Harrison Matthews, Julian Huxley, Stephen Marchant and A.N. Worden. James Fisher, who climbed to the peregrine eyrie at the Wick to ring the two eyasses, was another. Peter Scott was not so fortunate: heavy seas encountered off St Ann's Head prevented him reaching Skokholm.

John Fursdon was appointed Skokholm warden, honorary and unpaid, for 1946. He had first visited Skokholm in 1938, returning the following year and again in the late summer of 1940 as the Lockley family prepared to leave. Of his 1946 experience he recalls (Fursdon, 1996):

"At that time, the fashion for 'partners' had not started – not that I had one. I was then a bachelor of 25. Custom then dictated that either one was properly married, or simply single. Times have indeed changed."

John Fursdon Collection

Relaxing on The Knoll, Skokholm, with the Heligoland Trap in the background

The 1946 season on Skokholm began on 12 April. By the 20th a new Heligoland trap had been constructed with the help of Colonel H. Morrey Salmon, a regular pre-war visitor to the island. Unfortunately a shortage of rings meant that the ringing total of 2,993 birds was far below what it would have been had every bird trapped been ringed. The following year the total was 6,096 birds.

A series of volunteers acted as wardens on Skomer. Chief among them was Ronald Lockley and his brother-in-law John Buxton. Key support was provided by Joan Keighley "whose cheerful rattle of milk buckets at 6.30 a.m. heralded every new day". One of the unsung heroes of these pioneer days, she served as Assistant Warden on Skokholm from 1947 until 1950 and then married a lighthouse keeper.

The first visitors to Skomer, a party of 13 from Bristol University led by R. Bassindale, arrived on 1st April and remained until the 11th. They made the first comprehensive surveys of intertidal marine life in North and South Havens and at several other less accessible points around the island.

Particularly noteworthy bird records from Skomer included a bluethroat, the first for Wales on 9th May. A serin on 2nd April and a spotted crake on 15th September were first records for the Pembrokeshire islands. The latter, caught at night "was borne back to the house to be ringed, and to be shown to an incredulous company who came hurrying downstairs in pyjamas and night-dresses to see this extremely elusive bird."

The breeding seabirds quite naturally received much attention. Gulls provided a welcome harvest of eggs for the kitchens on both islands, as hens' eggs were still rationed. About 5,000 guillemots nested on Skomer in 1946; now there are over four times that number. The fortunes of the puffin colony across the years have been in reverse, with some 50,000 pairs nesting in 1946. At this time they nested not just in the cliff slopes but also at the base of field boundary walls and in grassy knolls towards the island's centre. By the mid 1960s numbers had been reduced to about 7,000 pairs, all on the cliff slopes. A welcome increase has since occurred with 21,000 individuals in 2015.

Grey seals have also prospered on Skomer since 1946, when about 50 pups were born. In 2015 the number was 240. One of the last visitors in 1946

John Fursdon Collection

Ronald Lockley on Skomer

John Bull

Ludwig Koch recording the voice of a grey seal pup, Skomer 1946

was Ludwig Koch, the pioneer recorder of wildlife sounds, who arrived in late September. He described how his equipment, weighing well over one hundred pounds (45.3kg), was lowered into the Seal Hole for him to capture, for the first time, the calls of the seals with their young in the cave darkness.

So the island year came to an end, both islands being evacuated early in October using the *Storm Petrel*. As described in the opening sentence of the Field Society's Annual Report, 1946 had certainly been "an exceedingly busy year". It was a year which saw the post-war reopening of Skokholm as a Bird Observatory and the pioneer Field Centre on Skomer. Although it only operated for that season, the wide ranging studies carried then out played a major part in the eventual purchase of the island and its declaration in 1959 as a National Nature Reserve.

## Sgogwm a Sgomer 1946

Ym 1946, ar ôl diwedd yr Ail Ryfel Byd, ailagorwyd Arsyllfa Adar Sgogwm a sefydlwyd Canolfan Faes ar Sgomer. Roedd y cofnodion a'r gweithgareddau pwysig a ddilynodd yn ganlyniad i ymroddiad a brwdfrydedd y rhai a gyfrannodd at y gwaith. Mae tîm o Brifysgol Bryste wedi cynnal yr arolygon cynhwysfawr cyntaf o fywyd morol rhynglanwol yn Hafanau'r Gogledd a'r De. Roedd yn rhaid i ymwelwyr, gan gynnwys nifer o naturiaethwyr adnabyddus, ddod â'u llyfrau dogni o gyfnod y rhyfel gyda nhw, ac roedd angen cwponau ar gyfer tanwydd. Gallai teithiau i'r ynysoedd ac yn ôl fod yn beryglus, ac roedd tywydd gwael yn tarfu arnynt yn aml. Adeiladwyd trap Heligoland newydd, er bod prinder modrwyau yn golygu mai dim ond 2,993 o adar gafodd modrwyo'r y flwyddyn honno; y flwyddyn ganlynol roedd y cyfanswm yr adar yn 6,096. Mae'r cofnodion a wnaed bryd hynny'n amhrisiadwy ar gyfer dangos tueddiadau hirdymor poblogaethau adar a morloi.

***David Saunders*** *was warden of Skomer Island from 1960 until 1966, later organiser of Operation Seafarer the first national seabird census, and subsequently Director of the Wildlife Trust West Wales.*

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John Fursdon Collection

John Fursdon Skokholm Warden (left) supervising the water carriers. Note the German U-boat binoculars, now owned by the author

All photos Liz Lewis-Reddy

# Pumlumon: a truly Living Landscape

Llyn Cwm Byr in low sun

*For over half a century, decline has been the story for upland areas like Pumlumon; decline in biodiversity, rural communities, and the services which the uplands provide for wider society. One Wildlife Trust is deeply involved in efforts to reverse this trend, and establish an economy based on sustainable land management which will benefit people, nature and natural processes, as* ***LIZ LEWIS-REDDY*** *explains.*

'Piloting an upland economy based around sustainable land management' is a very dry phrase to describe the innovative ambitions of the Pumlumon project. Yet it does sum up what we hope to achieve in one 40,000ha corner of the Cambrian Mountain range. But first, a bit of background.

Over thousands of years, humans and their companion animals have helped to shape the landscape we recognize today. Free-ranging herbivores have long been replaced by flocks of domesticated animals, principally sheep, with the consequent impacts upon habitat and species diversity. The sessile oak woodlands which once reached high into the Cambrian Mountains have been replaced by acres of species-poor turf and, in the last half of the 20th century, by fast-growing conifers. Post-war pressure for home-grown food drove extensive upland 'improvement' in the form of drainage and re-seeding with modified grasses, destroying swathes of blanket bog in the process. Stimulated by the agricultural subsidy system, as well as the pressure of market forces, a historic shift took place from mixed farming with cattle to intensive sheep farming,

resulting in uniform grassland swards. All of which has been catastrophic for upland ecology, as discussed by David Elias in *Natur Cymru* 57. Alongside these alterations to the ecology of our landscape, the human face of our countryside has also been undergoing significant changes.

The farming economy once represented an array of employment opportunities, with family farms capable of supporting at least two generations of the same family, with two or three farm workers thrown in. Today many upland farms are dependent upon subsidy and the decline in the viability of small farms, combined with a rise in house and land prices, means too few families are able to eke out a living connected with their local environment. This has altered social networks and the structure of local communities, with the loss of village services (schools, shops, post offices, pubs) as a consequence.

## Global pressures

The Met Office predicts that climate change will alter rainfall patterns with an increase in intense rainfall and a rise in average temperature[1]. These irregular patterns of rainfall will increase the risk of flash floods downstream, the impact of which northern parts of England know all too well. Higher average temperatures will result in a decline in snow and frosts, putting pressure on those species specifically adapted to a cold, 'arctic' climate; plants like alpine clubmoss which still cling to the tops of Pumlumon Fawr, and the enigmatic cloudberry (a diminutive alpine relative of the rowdy lowland bramble) which may already have lost its niche altogether. Given these pressures, what is the future for the habitats and wildlife of these areas and the human communities, both upstream and downstream, that depend upon them?

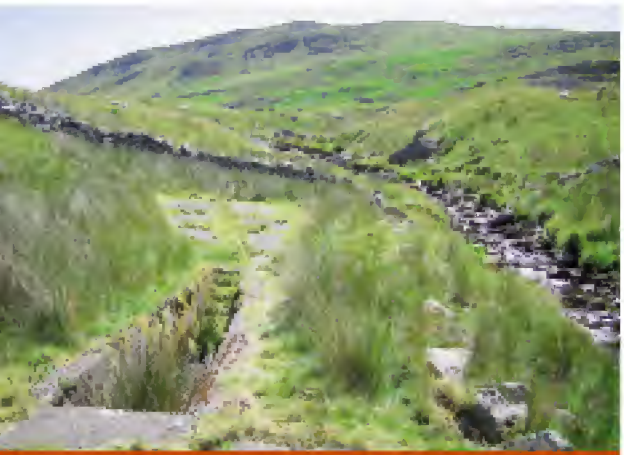
There is a growing recognition that sustainable use of our environment can only be achieved by taking full account of the functional relationships and processes within ecosystems and our impacts on them (see Mick Green's article in *Natur Cymru* 57). Sustainable management of ecosystems and ecosystem processes at a landscape-scale can deliver a range of services that contribute not only to our well-being but also to economic prosperity. These services are often not

Alpine clubmoss needs cold weather and is under threat from climate change

valued, and this adversely affects both biodiversity and social structures in the Welsh countryside. Collectively termed 'ecosystem services', it is these services which can be used to provide a sustainable basis for economic activity.

It was the recognition that these pressures were interconnected which provided the Montgomeryshire Wildlife Trust with its vision for Pumlumon. By focussing on strengthening the link between ecology and economy, the Pumlumon Project was designed to address all of the above collectively; working with Nature rather than against it. After all, no one individual farmer can prevent the flooding of lowland towns, mitigate against climate change or develop and access emerging economic opportunities, but by working together across 40,000ha, they can.

The model for the Pumlumon project is simple... Working with local communities, land managers, statutory agencies, and both local and national businesses, the Pumlumon Project is working to restore and strengthen the link between ecology and economy, piloting a new economic framework built around the three tenets of sustainability: environment, economics and community. Tenet one will be delivered through the implementation of appropriate multifunctional land management, either at the farm level or cooperatively between landholdings. This means landscape-scale habitat creation and restoration, changing grazing to benefit



Evidence of former activity on sites now abandoned

heathland species, planting trees, and repairing damaged bogs and watercourses. Tenet two will be met through the assessment and valuation of the ecosystem services delivered as a result of this management. Both will contribute to the delivery of tenet three – renewed social vigour within local communities in the project area as they are informed and empowered to find the necessary solutions for their future.

In 2008, following two years of extensive consultation and assessment, both ecological and economic, funds were secured for a pilot project. We aimed to show that habitat restoration created natural carbon storage and flood water management. Indeed, by working with private landowners, the Pumlumon Project team began to prove that not only were these aims achievable but that the limiting factor was not the number of landowners willing to consider an alternative agricultural economy but the resources required to develop the new market mechanisms.

Critical to the development of these mechanisms has been the implementation of scientifically validated monitoring protocols across a range of the pilot project areas. These have included: habitat surveys on a number of flood water management sites before and after modification; hydrological monitoring of water table depth and surface water flow; and Riverfly Partnership[2] monitoring on tributaries of the River Dyfi as biotic indicators of water quality. We knew at the outset that monitoring at this scale would lend credibility to the outcomes of the project; the impact of the practical management moved from being purely anecdotal to gaining scientific validity.

To date, 13 sustainable land management schemes are underway covering 1258 ha of the project area at a combined monetary value of £892,970 per annum. These works are helping to generate an environmentally diverse, dynamic landscape. By re-wetting drained peatland we are already benefitting the beleaguered red grouse, with tentative evidence of a population upturn. Heathland quality indicators are also going the right way with a return of the hen harrier to the area, but obtaining good evidence will take time.

Of course it doesn't end there. The 13 schemes and their habitat works have also addressed a number of socio-economic issues including reducing pollution from a range of activities, flood water management, water quality, carbon sequestration, declines in the rural economy, local culture and heritage, and helping to promote access, recreation and value-added food production.

Here are some statistics which illustrate what these schemes have achieved:

- 35km of artificial drains blocked
- 950,000 tonnes of carbon safeguarded in restored peatland
- 449 million litres of additional water retained in the project area
- 4.5 km of species-rich hedgerow created
- 30,000 additional visitors to the area

But these figures are only a fraction of what is possible. As the project has grown, a significant proportion of the project team's time has been dedicated to sharing the long-term vision of the countryside with local people, policy makers, Welsh and Westminster governments and the private sector. The Project has hosted two MPs, two Welsh Government Environment Ministers and one Deputy Minister for Food and Farming, two Welsh Government Cross Party Select committees and a host of other public and private sector groups. The project has also engaged the media through

appearances on Countryfile, interviews with Chris Packham, and with ITV and BBC News following the severe winter flooding events in the Southwest in 2013. Let's hope some of the people we have touched were listening.

Over the past eight years the project has demonstrated through good science and sound economic analysis that ecological restoration can bring economic, social and environmental benefits. This evidence helped us to secure funding from the Welsh Government's £6 million Nature Fund and to become one of three UK projects awarded Peatland Code accreditation by the International Union for the Conservation of Nature (IUCN)[3]. But we recognise that the ambition of 'an upland economy based around sustainable land management' will take a huge shift in attitudes and expectations of both the public and private sector. We're not quite there yet but, until then, we will continue to seek funding both large and small to develop a rural economy firmly embedded in the health and resilience of the landscape that surrounds it.

***Dr Liz Lewis-Reddy** is Head of Living Landscapes at Montgomeryshire Wildlife Trust.*

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## Pumlumon - tirwedd byw

Mae ucheldiroedd Cymru wedi bod yn dirywio'n ddifrifol ers dros hanner can mlynedd, ond mae prosiect ym Mynyddoedd y Cambria yn ceisio mynd i'r afael â hynny. Arweiniodd pwysau wedi'r rhyfel am fwyd wedi'i dyfu gartref at ddraenio a phori defaid yn ddwys ar yr hyn a oedd yn orgors ar un adeg. Mae hyn yn effeithio nid yn unig ar ecoleg a bioamrywiaeth lleol ond yn caniatáu i ddŵr fynd i lawr yr afon, gan gynyddu'r risg o lifogydd. O ganlyniad mae cymunedau a chynefinoedd lleol yn dioddef o ddiffyg maetholion. Mae Ymddiriedolaeth Bywyd Gwyllt Sir Drefaldwyn, mewn partneriaeth ag eraill, wedi bod yn gweithio ers deng mlynedd i geisio lliniaru'r effeithiau hyn drwy weithio o amgylch tri chonglfaen cynaliadwyedd – yr amgylchedd, economeg a chymuned - ar 40,000 o erwau Pumlumon. Mae monitro gwyddonol wedi profi bod yna effeithiau buddiol ac mae hynny wedi cael ei hysbysebu'n eang, gan bawb, o weinidogion y llywodraeth i Countryfile y BBC.

Rob Parry

# When to intervene

The River Thaw in the Vale of Glamorgan, once home to populations of water vole

*To paraphrase a famous party political poster – 'Nature conservation isn't working'. Despite a higher profile, greater legislation and changes of political power, the environment in Wales is suffering more than ever and species and habitats seem unable to recover from their losses. ROB PARRY asks if we need to cross the boundary of non-intervention and do more to help.*

There are perhaps as many definitions of 'nature conservation' as there are nature conservationists, but to me, in its simplest sense, nature conservation has always meant doing as much as one can to enable as much wildlife to inhabit as many places as possible. I had always thought that this could be achieved by managing the land, through nature reserves, protected sites and our wider countryside.

## Changing times

When evaluating the nature conservation sector today, one could be forgiven for thinking it is as good now as it has ever been or will ever be. Our opinions are being heard at the highest level of government and the environment is being mentioned in all major aspects of society, from economic growth to health and education. Truly the pinnacle of the Conservationist's dream – nature conservation is now mainstream.

Why is it then, that, despite all the perceived advancements in this sector, we have entered the darkest period for nature conservation that Wales has experienced in recent memory? The continuing losses to our

habitats and species in Wales are a stark reminder of the reality we face. Several species have already suffered local extinctions and many more teeter on the brink. It has become clear that nature conservationists can no longer deny the very real need to intervene directly to save our wildlife.

### Regrets and ramifications

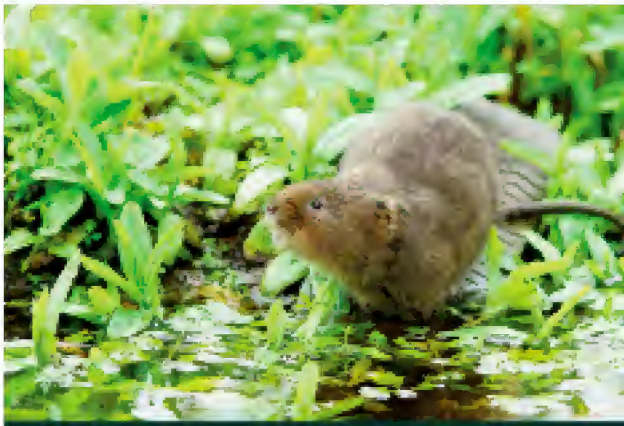
I remember my first few months as a nature conservation volunteer, surveying for water voles on the River Thaw in the Vale of Glamorgan. It was one of those idyllic summers of sunshine and wildlife, watching kingfishers, otters and yes, water voles. Back then conservationists were only starting to get to grips with the enormity of the decline of the water vole in the UK, and great effort was being placed on surveying previously known locations, the River Thaw being one of them.

The real starting point to my nature conservation career was the day we found them on the river. It was only a 50m stretch of the whole river catchment, but it didn't matter, they were here, latrines, burrows, food piles and all. I didn't know a great deal about population sizes and dynamics back then, but it never occurred to me that they would one day disappear from the river altogether. I positively denied the notion of their extinction, and as for the concept of trapping them for breeding programmes and future reintroductions, surely this level of intervention wasn't nature conservation, it was alien, it was 'unnatural'. After all, we aren't gardeners.

Within two years of first finding the River Thaw water voles, they had disappeared. Initially the negative survey results were blamed on bad luck, or perhaps they had moved upstream. They hadn't. They were gone for good and I watched it happen.

### Unpalatable intervention

When I look at a landscape now for a species such as the water vole or the marsh fritillary butterfly, I don't just see fragmented habitat islands hosting ever more precarious meta-populations, I see the overwhelming unnatural barriers that these species have to contend with every day. Their landscape is now filled with roads, buildings, car parks, drainage ditches, invasive plants and animals, pathogens,



Peter G Trimming CC 2.0 Generic

Water vole *Arvicola terrestris* Llygoden bengron y dŵr

fertiliser, pesticides, herbicides, deforestation, afforestation and sheep, lots and lots of sheep. Even our grass has been unnaturally modified through generation after generation of selective breeding. With all the unnatural pressures wildlife has to contend with, why on earth wouldn't a nature conservationist intervene for a species?

The truth is, despite the overwhelming pressures, it is still far more palatable for the professional nature conservationist today to monitor the disappearance of a species rather than intervene to save it. Could it be that nature conservationists, as with the rest of society, have become immunised to the unnatural pressures impacting wildlife? Have we simply accepted it?

### Why wouldn't we intervene?

Intervention at the species level could never and should never replace the importance of habitat management and habitat creation. But given the current political apathy toward wildlife and nature conservation in Wales, relying on habitat management alone may not be enough to prevent further local extinctions. 'Unnatural' nature conservation efforts in the short-term – such as population reinforcements, supplementary feeding and artificial shelters – could prevent the loss of wildlife in the long term.

For instance, water vole populations in upland Wales can fall by up to 70% during winter months, owing to the harsher conditions and limited food availability. Why then, given the inordinate battle they are up against, aren't we as nature conservationists feeding

Emyr Evans

Osprey chick Ceulan, shortly after his life-saving meal of raw trout at the Dyfi Osprey Project

our upland water voles in winter? Juvenile water voles must reach a weight of over 170g if they are to survive the winter months and supplementary feeding is a sure way of obtaining that goal. It would undoubtedly increase winter survival in the population, providing more spring breeders and therefore greater dispersal to new and old areas in their local range. Despite the benefits of this unnatural intervention it isn't widely adopted as a nature conservation tool.

The obvious hypocritical contrast is that we spend over £200 million each year supplementary-feeding garden birds. One of the most significant benefactors of this is the blackcap: this once strictly summer migrant has become a regular visitor to our garden bird tables in winter. Research undertaken by the British Trust for Ornithology (BTO) shows that supplementary feeding in the UK has enabled blackcaps to take advantage of our warming climate to the extent that many blackcaps breeding in central Europe no longer migrate south-westerly to the wintering grounds in Spain but, instead, now over-winter in the UK.

It may not just be the blackcap that has benefited from supplementary feeding, as the BTO are now looking into whether the increase in the goldfinch population over the past 30 years is related to supplementary winter feeding from our gardens. Supplementary feeding for birds, however, can be far more involved than peanuts and sunflower hearts. In his book *Ospreys in Wales – the First Ten Years*[1], author Emyr Evans describes the ultimate nature conservation intervention that occurred at the Montgomeryshire Wildlife Trust's Dyfi Osprey Project in 2012. Unseasonal wet weather in May and June of that year had reduced the ospreys' brood down from three chicks to just one. After the heavy rain had passed, the remaining chick, undernourished and too exhausted to call for food, was certainly going to die. As the Project Manager, Emyr had a decision to make:

*"It [supplementary feeding] was a concept that I had firmly turned down in the past... these were wild animals and not to be interfered with... By 3pm that Saturday afternoon however, I was having second thoughts."*

Emyr and the team did intervene, first by removing the chick from the nest, then by warming it, and, as the chick was too weak to take food from the hand, eventually by forcing shop-bought trout down its neck into the gullet.

*"After just a couple of minutes the chick seemed to acquire a new lease of life... the food had an almost immediate effect and he stopped shivering. I would never have believed that such a small intake of food would have such a spontaneous reaction."*

The osprey chick survived, but if Emyr had followed his first thoughts of non-intervention, it would almost certainly have died. The osprey is one of Wales's rarest breeding birds with fewer than ten pairs in the whole country but, despite this, I can still imagine the derision levelled against this intervention. I can picture the 'it's unnatural' and 'we're not gardeners' arguments and I wonder what good would have come by watching the nest fail altogether.

Once you balance all the unnatural pressures acting against our Welsh ospreys – loss of nest sites, overfishing, expanding deserts, direct persecution, egg collecting, human disturbance and wetter summers – why wouldn't we intervene?

### Old concept, new direction

Intervening for a species isn't a new concept, nor is it something we are unfamiliar with in Wales. The red kite, after centuries of persecution and near extinction, was saved by the intervention of nature conservationists.

If I had my time again, I wouldn't have watched the water voles disappear on the River Thaw. I would have intervened to save them. I wouldn't have cared about being called a 'gardener' and I wouldn't have placed so much faith in an unnaturally impoverished countryside miraculously restoring itself and the wildlife it should support. How could it?

Today, there are over 500 species listed as being **of principal importance for the conservation of biological diversity in Wales** (NERC Act 2006). Over the coming decades, most of these species will continue to decline and several will be lost from our shores altogether. 'Natural', non-intervention nature conservation is the beacon we should all aspire to, but for the time being, it's a luxury wildlife cannot afford.

***Rob Parry** has volunteered and worked professionally in nature conservation for over 15 years.*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## Pryd i ymyrryd

Ydyddiau hyn mae trafodaethau am yr amgylchedd a gwarchod natur yn cael lle blaenllaw gan gymdeithas yn aml. Ond er hyn, rydym yn dal i weld colledion trychinebus o ran rhywogaethau a chynefinoedd. Mae'n rhaid i fywyd gwyllt ymdopi ag adeiladu, seilwaith, draenio, cemegau di-ri, newid defnydd tir, cystadleuaeth gan rywogaethau anfrodorol a newid yn yr hinsawdd. Mae'n ymddangos bod yna ormod o bwysau ar ddibynnu ar adferiad naturiol. Un ffordd o fynd i'r afael â hyn yw drwy fynd ati'n fwriadol i ymyrryd. Rydym yn bwydo miloedd o adar yn ein gerddi bob blwyddyn eisoes: beth am ymestyn hynny i rywogaethau mewn perygl fel llygoden y dŵr? Fel arall, efallai y byddwn yn gweld hyd yn oed mwy o rywogaethau Cymru yn diflannu o'r tir.

### PINE MARTEN REINTRODUCTIONS

A reader has raised concerns about the reintroduction of pine martens in mid-Wales, asking about possible effects on wildlife and domestic fowls. David Bavin from the Vincent Wildlife Trust has replied as follows:

- Pine martens are highly omnivorous; small mammals constitute the most important diet element, with a significant proportion of invertebrates and fruit. They do predate birds, but they are not bird specialists – there is no peak in bird predation associated with spring or summers end (nests/fledglings). Published research suggests that predation of birds and nests is opportunistic, and the species predominantly predated are common woodland birds such as wren, tit species and woodpigeon. Woodcock and pheasant are not uncommon in the diet because they live and nest on the ground.

- On average, a single pine marten holds a territory of 2-4 sq km, from which it excludes other martens. They are therefore very sparsely distributed in the landscape. They are also a native predator, co-evolving with woodland birds for tens of thousands of years – woodland birds have evolved adaptive strategies to coexist with pine martens. Significant levels of nest predation by martens tend to occur in man-made structures, such as buildings where swallows nest. Dogs will normally keep martens away from such sites.

- The marten competes with, and will actively remove, corvids and grey squirrels; these are arguably more effective nest predators than martens.

- Chickens are an easy meal for many predators! If you live in an area with polecats, foxes, buzzards, goshawk, badgers, stoats or mink, then you will already have adequate protection for your chickens; a pine marten will not be a significant extra problem. If you do experience problems, or need more information, then the Vincent Wildlife Trust has guidelines on how to effectively protect your birds, based on mitigation work in Ireland and Scotland.

## Moulding and casting a fossilised coral

For many years curators at the Department of Natural Sciences at Amgueddfa Cymru—National Museum Wales had been aware of the existence of a particularly impressive and well preserved coral at a beach near Ogmore-By-Sea. The fossilised colony of rugose coral *Solenodendron horsfieldi* was roughly 50cm wide and 65cm long and dated from the Carboniferous period, but having survived for some 350 million years it was now in danger of physical damage. The fossil sat on a ledge on top of a limestone layer, within mudstone which had eroded away, and over the years the risk of damage from weather and visitors to the beach was increasing.

The position and sheer size of the specimen meant that it would be problematic to excavate, so the decision was taken to create a mould and then make a replica cast. The cast would not only provide an accurate scientific record but would also be used for outreach activities at the museum.

The work needed to be completed in one day, during daylight hours, whilst the tide was fairly low, so fast-setting moulding materials appropriate for outdoor use were tested. Even though a day with calm and dry weather would be chosen if possible, plans were made to deal with wet and windy conditions if the weather changed. A Platsil 70-25 condensation cure silicone was chosen for the mould and Jesmonite AC-300, a gypsum-based material in acrylic resin, for the support casing.

AC-NMW

The team preparing the coral for moulding

On 1st July 2015, therefore, a team of conservators and curators set out for the beach. All the materials and equipment were carried down from the car park and positioned on the ledge next to the coral. The team started work by filling any undercuts and holes in the specimen with clay so that none of the moulding materials would get trapped and set in the hollows. A wall of clay was also positioned around the edge of the coral to stop any excess material running off on to the surrounding rocks. Several layers of fast-setting silicone were then brushed and poured onto the surface, smoothed down and left to set. Next, layers of Jesmonite were brushed onto the surface and reinforced with sheets of jute to create a solid support case. When all was completely dry the mould and support case were removed and the specimen was washed, cleaned and left undamaged.

AC-NMW

The finished replica cast

Back at the museum the cast was created by brushing layers of coloured acrylic resin into the silicone mould. Once set, the cast was removed from the mould and the surface was finished with acrylic paints to replicate the subtle details of the original coral specimen.

Part of the fossilised coral can still be seen at Ogmore beach but, as feared, in December 2015 the specimen split into two pieces. Museum staff are working to recover the loose portion.

We are very grateful to have had the opportunity to work on this scientifically interesting specimen and to capture an impression of it for our visitors.

***Annette Townsend, Caroline Buttler and Cindy Howells***

## Urban Buzz

It is well known that pollinators are in decline. Recent work by Bristol University as part of the Insect Pollinator Initiative (IPI) clearly demonstrates there is a missed opportunity in urban areas to provide habitats for pollinators which will act as key links in the landscape[1].The work identified that urban environments could act as important food source areas, refuges, and corridors of favourable habitat.

In November 2015 Buglife launched its latest and largest project to date, Urban Buzz, which aims to inject colour and wildlife back into cities, transforming mown and unused amenity grass and urban sites into vibrant areas which are rich with colour and buzzing with life.

**Get Cardiff buzzing**

Over the next three years Buglife will work with eight cities across England and Wales to establish flagship 'Buzzing Cities'. Cardiff was one of the cities chosen; as the Welsh capital it's hoped it will become a flagship location and reach out to the rest of Wales. Whilst the project is designed for pollinators generally, we will also take into consideration the specific requirements of rare species such as the brown-banded carder bee *Bombus humilis* where they occur.

Each urban centre will receive 18 months of intensive support, thanks to a generous grant fund of over £1 million from Biffa Award, with additional funding coming from the Garfield Weston Foundation and supported in Cardiff by the Heritage Lottery Fund. The project will employ innovative techniques engaging a diverse and varied range of people, groups and organisations. A total of 100 'Buzzing Hotspots', equating to at least 25 hectares, will be established by creating new habitats and enhancing existing spaces. These will provide wildflowers and nesting sites such as bee hotels for pollinator species.

The funding will provide free training and equipment for urban land managers and local volunteers, giving them the skills, knowledge and tools to create and manage their sites. A series of Buzzing Packs full of creative, informative resources will be made available to support anyone who wants to be involved.

As Cardiff Urban Buzz Project Officer, part of my job is to consult our key partner Cardiff City Council, local residents, and a range of other partners, groups and individuals, to find exciting sites for pollinators and the best places to create new flower-rich areas which will enhance the city. This initial work will be followed by intensive seed-sowing and plug-planting to create lush, vibrant, flower-rich swards. Training in assessing sites has already started and dates for further training in activities such as scything, and bee and plant identification will soon be put in place.

*Michelle Bales*

If you would like more information or want to get involved in the project please contact me at **michelle.bales@buglife.org.uk** or visit the website **www.buglife.org.uk/urban-buzz/cardiff**

**Reference:**
1. Baldock, Katherine C. R. et al. 2015. *Where is the UK's pollinator biodiversity? The importance of urban areas for flower-visiting insects*. Proc. R. Soc. B. Vol: 282. Issue: 1803. Available at: http://rspb.royalsocietypublishing.org/ [ Accessed: 14 January 2016].

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# Green **Bookshelf**

## *The Essential Guide to Beachcombing and the Strandline*

***Steve Trewhella and Julie Hatcher***
***Wild Nature Press***
***2015, 304 pages***
***Paperback £16.99***

Essential Guide? Absolutely. This is a must-have book for anyone with any interest in what can be discovered while perusing whatever is left beached at the strandline. Here you will find concise and useful information, and much practical advice. Whether you just wish to know what lives on or frequents beaches, identify the remains of organisms washed up, or delve deeper into the origins of marine litter and the life that may be found associated with it, there is something for you inside. A book for enthusiasts of all ages and experience. Moreover, a fun book for children and families to use.

The front cover is attractive, and the succinct text and images of the back cover enhance the attraction with promises of mysteries to solve. Physically, the book is solid, with tightly bound and good quality glossy pages. It is designed to be taken into the field, and will last. The gatefold flaps strengthen the covers further and the book is of a size (216 x 141 x 19 mm) that should easily fit a good coat pocket – it does mine!

It is clear that this guide is a labour of love. The layout is simple and neat with well-defined headings, clear and uncluttered graphics, and the photographs (mostly by the first author) are of a very high standard. The front contents pages and rear index ensure rapid navigation, and each can be usefully bookmarked by the gatefolds.

Species are, where possible, labelled with their common and scientific names, and their sizes given. The book covers algae of all sizes and hues, and animals right from gastropods and amphipods at one centimetre long to large vertebrates like whales at 30m. The accompanying texts are short and informative and accessible to all. They include facts on species morphology and habitats, with interesting additions derived from the authors' own experiences.

The 34-page section on 'Marine and Beach Litter' is superb. The variety and quantity of this is staggering, as is its often catastrophic effect on marine life. The authors are to be congratulated on presenting this in such a way that readers will be enthralled. If collecting, identifying and removing this ever-increasing contamination of our shores (some originating in North America) can be made a fun activity for all seasons, then so much the better. I certainly would never have guessed what some of the objects were or how they were used. Some are attractive enough to encourage collectors to seek them out.

So, acquaint yourself with the authors' suggested kit list, wrap up warm and waterproof against the British weather and see what you can find on our beaches and strandlines.

**Andy Mackie**

## *Rhayader by Nature*

***Bob Dennison, Steve Jones, Richard Knight, Sorcha Lewis, Phil Ward, Ray Woods***
***Rhayader by Nature***
***252 pages, Softback £13.99 including P&P***
***Available from www.rhayaderbynature.wordpress.com***

What an incredible story. How many readers have heard of Rhayader by Nature, a local natural history society formed in 2003 to explore the natural heritage of Rhayader town and its surrounding district? Their book of the same name takes stock of the natural heritage in this discrete and essentially rural community of approximately 130 square miles, from the bed of the River Wye to the remote rocky outcrop of Drygarn Fawr.

The first part concerns the landscape, weather and six habitats, from the upland heaths to the built environment of Rhayader and the surrounding villages.

Chapters on the wildlife follow, commencing with plants and fungi and including a notable range of specialist heavy-metal-tolerant lichens on the highly toxic spoil tips of long-exhausted mines and the track bed of a disused railway line.

Thirty-six species of mammal have been recorded, and 97 breeding bird species, while a further 83 have been noted as visitors. Reptiles, amphibians and fishes are followed by chapters on dragonflies, butterflies and moths, and other invertebrates. As in most areas, these are under-recorded, though one cannot say that

about the glow-worms near Llanwrthwl where one enthusiast has been recording them for over 20 years.

The concluding chapter provides information on 15 walks and 12 easily accessible 'viewing spots' which capture the essence of the Rhayader district. You may not see an otter or an Atlantic salmon but there are sights and sounds for all to enjoy. The final pages hold an essential location map, so there's no excuse for missing out on this special place.

**David Saunders**

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***The Island Artist***
***Ann Lockley & Martin Lockley***
***Dinosaur Designs,***
***85 pages,***
***£6.30 including postage*. Softback***

With the sub-title 'a portfolio of the artwork of Doris Lockley from wild West Wales', in this delightful little book daughter Ann and stepson Martin have brought together many of their mother's illustrations from the Skokholm years. In 1928 Doris married Ronald Lockley in the tiny church at St Bride's. A photograph of the happy couple in their boat *Storm Petrel* shows them leaving for Skokholm, where they lived until wartime restrictions caused them to depart in 1940. A remarkable story, which one never tires of hearing about.

Doris provided illustrations for four of her husband's island books: *Dream Island, The Island Dwellers, Island Days* and *I Know an Island*. There are also over 50 illustrations, mostly birds, in Ronald's often overlooked *Birds of the Green Belt* – the 'Green Belt' being the countryside around London. What a contrast to Skokholm.

Doris had seven articles published in *The Countryman* between 1938 and 1940. One of the few illustrations which she signed is a map extending from Milford Haven to Grassholm. This was provided to the participants of the Ornithological Congress who reached Skokholm in 1934, and subsequently used in the Lockleys' brochure about visiting the island.

How fortunate that the drawings survived across the years and are now published so that we can appreciate and enjoy another fascinating aspect of the Skokholm story.

* Available from The Friends of Skokholm & Skomer, Old School House, Marloes, Haverfordwest, SA62 3BQ

**David Saunders**


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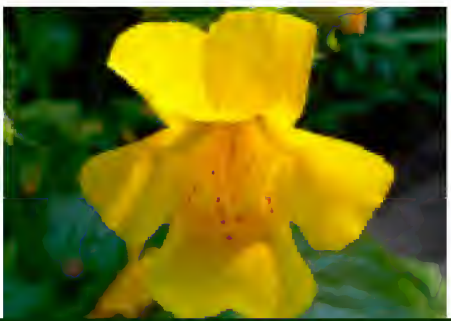

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## Re-wilding the Ranges

If you take the mountain road from Llanuwchllyn to Trawsfynydd and look down into the catchment of the Afon Gain, you will see something remarkable: a wood is growing up. I don't mean a bit of scrub in the valley bottom but a1000-acre broadleaved woodland. True, it is still at the thicket stage and studded with patches of Sitka spruce, but where else in Wales can you see a 400-hectare, freely regenerating woodland at 500m?

Known locally as 'the Ranges', the history of this place is fascinating. From 1903-1965 a large area of these hills was used by the MOD as a firing range. In the mid 1960s shelling was discontinued and the core area handed over to the Forestry Commission; something of a poisoned chalice, since the ground was full of unexploded ordnance. Three brave drivers in armour-plated caterpillar tractors ploughed it ready for planting. Gangs of local men, reputedly on 'danger money', and with a lucrative sideline in brass scrap from shell casings, then planted it with Sitka spruce. By the turn of the millennium it was ready for felling and the timber was extracted in 2001-03. This time a man with a metal detector walked ahead of a mechanical harvester, which had a long reach and bullet proof windows. The FC now had a 400ha clear-fell full of unexploded ordnance – still a hazardous place to work. The decision was taken to allow an upland broadleaved woodland to establish – perhaps the largest in Wales. Here and there birch branches, laden with seed, were stuck in the ground to encourage regeneration; otherwise nature was just allowed to get on with it.

The view westward from the top of the pass is impressive: the jagged frieze of the Rhinogydd frames a great bowl of land chewed into shape by generations of sheep. In the centre is a big spread of seemingly random patches of scrubby birch, sallow and Sitka spruce linked with open patches, often dominated by heather. In stark contrast to the surrounding bald and bitten hills the vegetation between the young trees is luxuriant. It overflows with bilberry, crowberry, bell heather, tormentil, heath milkwort, various sedges, and a profusion of lichens. This is one of the best places in the county to see black grouse lekking. Short-eared owls, hen harrier, kestrel and cuckoo, as well as passerines such as whinchat, stonechat and grasshopper warbler, are regularly recorded. A high vole population, which is characteristic of these conditions, no doubt draws in the raptors. If you drive over at night thousands of moths can sometimes be seen in the headlights; surely just a hint of the vast supply of invertebrates emerging in this young woodland. All of this has been achieved by doing nothing since the trees were felled, except maintaining the boundary fence to keep the sheep out.

Of course this wood is only 15 years old and changing rapidly. Over time some of those species will be lost and others will arrive. My conservationist's instincts are to cut out the conifers and keep the heathland and boggy areas free of trees (see Mick Green's article in *Natur Cymru* 57). However, as it would be hugely costly to make the Ranges safe enough to work in, perhaps Natural Resources Wales (NRW) could make a virtue out of necessity. We don't know exactly how this wood will shape and evolve left to its own devices: it would be interesting to find out. After all, if spontaneous re-afforestation is encouraged in the future – for flood prevention, carbon sequestration, or re-wilding – then it is this kind of mixed woodland that will likely arise in the Welsh uplands. Looked at this way, the Ranges seem like an asset and a wonderful opportunity for NRW to demonstrate the wider benefits of our public forests.

NB – if you want to see the Ranges for yourself, the mountain road goes right through the middle of it but please keep to the roadside as the site remains dangerous for walkers.

***David Elias***

Andy Hay (rspb-images.com

Stonechat *Saxicola torquata*
Clochdar y cerrig

# Islands round up

Greg Morgan

The seal cow and pup on Skomer before their journey

**The Skerries**

This small group of islands just off the north-west corner of Anglesey is wardened by the RSPB during the breeding season. In 2015 3808 pairs of Arctic terns bred here, the largest colony in the UK. Leg flags are being fitted to adult terns to measure their survival rate. In addition, over the next five years a project is being set up to radio-tag adults, to discover where they are feeding during the breeding season. It is important to know this as developments such as underwater turbines are being considered for the seas close to Anglesey; if possible they should be sited away from tern foraging areas. A count of 578 occupied puffin burrows on the Skerries represents a sizeable colony for north Wales. Thanks to Ian Sims (RSPB) for this Skerries information.

**Overwintering on Welsh islands**

Spare a thought for those hardy souls spending the winter on two offshore islands, **Ramsey** and **Bardsey** (Ynys Enlli). Life on offshore islands is never easy, but at least staff on islands without livestock, such as Skomer and Skokholm, can leave for the mainland in early winter. You can read about the adventures of Greg and Lisa Morgan on their Ramsey blog on the RSPB website. In addition to pictures of the little harbour being pounded by Storm Frank at the end of December, you will see the test tidal turbine being installed in Ramsey Sound in mid-December by Tidal Energy Ltd (in a calm spell!). Floodlights were needed to allow the work to continue at night, so winter was the best time with the Manx shearwaters away in the South Atlantic.

Jo and Steve Porter live on Bardsey year-round, joined by Rachel and Ben during University vacations. This winter there were two new residents: Sian Stacey and her partner Mark Carter. Mark has been Assistant Warden at the Bird Observatory for several years, and Sian is the new Island Manager for the Bardsey Island Trust (replacing Rhodri Evans). Sian and Mark were all set to arrive at the start of December, but had to wait on the mainland until 27th when the weather relented and Colin Evans was able to take them and the young Porters across. Sian's blog about life on the island is at **www.bardseyislandlife.blogspot.co.uk**, with pictures of the whole gang bathing in the sea on January 1st.

Greg Morgan

Installing the turbine in Ramsey Sound

**Seal pup's epic journey**

Island wardens are busy logging new seal pups from late September onwards. On 30th October, Greg on Ramsey was very surprised to find a pup marked with two spots, purple and blue. He knew that the Skomer staff were using marks on individual pups, so quickly discovered that this was pup 193, born on Skomer at North Haven on 22nd and last seen there on 27th. Three days later here it was on Ramsey, being fed by a seal which was identified by its skin markings as indeed its mother from Skomer. A grey seal pup normally stays on the beach it is born on, fed by its mother for about 18 days until it is weaned, so this journey made by pup and mother across 6 miles of open sea is quite incredible. Read the full story on the Ramsey blog.

**SPA extension proposed for feeding terns**

Natural Resources Wales is consulting on an extension to the existing tern breeding colony SPAs at Ynys Feurig, Cemlyn Bay and the Skerries to cover the tern feeding areas during the breeding season. The extension is a large area off the east, north and west coasts of Anglesey, extending from mean high water to between 10 km and 20 km offshore. Recent studies by JNCC are beginning to confirm tern feeding areas, though more tracking work needs to be done.

*Geoff Gibbs*

## British Association of Shooting and Conservation
# Mink control to protect water voles

BASC's Green Shoots North Wales project began in 2006 (see *Natur Cymru* 24, p4), with funding from CCW (now Natural Resources Wales), to work with the shooting community and partners in order to encourage and demonstrate the conservation effort they were undertaking to achieve public conservation targets.

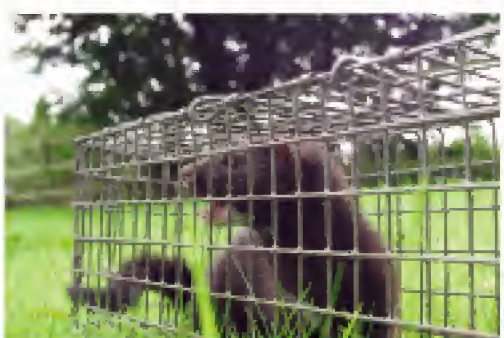
One of the aims has been to work with partners on a co-ordinated programme of mink control to benefit remaining populations of water voles. Water vole *Arvicola terrestris* are particularly vulnerable to predation by mink, and the American mink *Neovison vison* has been the main cause of a decline of more than 90% in water vole numbers in the UK. Mink also predate waterbirds such as ducks and moorhens, so their control has an even wider benefit.

### Anglesey

Initially, work was concentrated on Anglesey in partnership with Menter Môn, to protect the nationally important water vole populations there and to make the island mink-free. BASC members helped with operating mink rafts and trapping mink where they were found. The island is now more or less mink-free with only the occasional sighting in recent years. Menter Môn continue to trap both on the island and on the mainland side of the Menai Strait to keep it this way.

Following advice from the late Rob Strachan in 2011, we concentrated trapping on inland water courses on the Llŷn peninsula to create a pincer movement and push mink from the south up to the northern tip, making the trapping of remaining mink easier. Water vole surveys in 2011 revealed signs of remaining populations on the rivers Soch and Geirch and we were therefore concerned with protecting these. Members, including the Llŷn Keepers Group, operated more than 40 traps across the peninsula and caught more than 40 mink, most of them in the first two years. Over the last three years the same level of trapping effort on Llŷn has resulted in the odd one or two, so we hope that this shows the success of the programme in reducing mink numbers on the peninsula. We are aware that there are still gaps in the network and that there may be mink in the areas not being trapped, and so we will continue to encourage volunteers in the area to get involved in trapping.

BASC



Captured American mink (*Neovison vison* Minc)

Trapping has also taken place across other parts of North Wales. This has tended to be in response to an identified mink problem, but we did begin a co-ordinated programme on the River Dee around Corwen in 2013, as reports of mink in this area had been increasing.

BASC

The mink raft *in situ*

### Valuable volunteers

Volunteers are invaluable in helping to set up and monitor mink rafts. These lightweight plastic rafts include a tunnel into which a clay pad is inserted. Curious animals walk over the clay and leave footprints. If a mink print is left, then a trap is placed in the tunnel and set, and this is monitored daily to check whether any animals have been caught. The rafts considerably reduce the time spent trying to find the best trapping locations by indicating whether or not any mink are present. Any mink caught are humanely and legally dispatched and any non-target species such as water voles are released. If a volunteer is unable to carry out humane dispatch themselves, we can match them with local BASC members who can dispatch the mink.

The time commitment from volunteers varies. When rafts are in position they only need to be checked every week or two but, once a trap is set, it must be checked daily. Following Best Practice guidelines, trapping takes place from September,

when young are dispersing to set up their own territories, to the end of March, when the kits are born. There is no trapping in the summer months, to prevent leaving dependent young.

As well as loaning equipment such as rafts and traps to volunteers, we run training courses covering the ecological aspects of mink/water vole interaction and the practicalities and legal issues around trapping and dispatching mink. This ensures that anyone who volunteers to carry out trapping receives Best Practice guidance about what they will be doing.

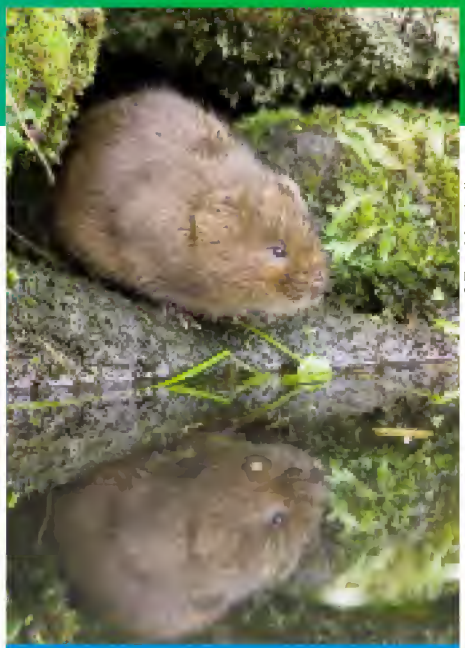
One of the important parts of the project is to record the effort put into mink control, including listing the locations of traps and monitoring rafts and, most importantly, the number and location of mink killed, and also of any water vole sightings. This enables us to identify and fill gaps in the network, and also to gauge the success of the trapping effort.

By 2014 a good network of trappers had been established across North Wales, with over 100 rafts and traps in place and, between 2011 and 2015, more than 460 mink were culled across the project area.

Based on this successful outcome, in 2014 BASC applied to NRW to expand the project to cover the whole of Wales and we successfully secured three years of funding to recruit members into the mink control programme (and a similar project for grey squirrel control to protect red squirrels in key areas).

Five areas were chosen for the mink control work - River Dulas in north-east Wales, Snowdonia National Park around Beddgelert, mid Wales near Aberystwyth and, in South Wales, Pendine & Llanelli, and Magor Marsh.

The targets are ambitious. We are aiming to recruit 136 new members and to have more than 340 rafts/traps in place by 2018, so members in these areas have been contacted to invite them to become involved. The funding enables us to loan the equipment free of charge, and more than 30 new rafts and traps have been deployed since April 2015. We can also offer free training to people within the key areas. Courses have already been run for partners, including NRW and Snowdonia National Park, North Wales Wildlife Trust's Alun-Wheeler Living Landscape project, and also for BASC members, with further training lined up for 2016.



© Tom Marshall

Water vole *Arvicola terrestris* Llygoden bengron y dŵr

BASC

Mink pawprint

In order to gauge whether or not the mink control is having an impact it is important to have baseline data on water vole populations, so water vole surveys are being carried out in the key areas over the duration of the project. Last summer I repeated the 2011 survey at over 20 sites on Llŷn with the help of volunteers, and we did find some positive water vole evidence, including feeding piles, droppings and even a sighting of one on the Soch, showing that they still survive there. We will be doing more surveys on Llŷn in Spring/Summer 2016, to collect further information on their range and volunteers are welcome to take part. It is only with the concerted effort of our volunteers and members that we can hope to ensure the survival of one of our best loved but scarce mammals.

*With over 25 years experience in countryside management in local and national government, **Audrey Watson** has been the Green Shoots Officer for BASC's Wales team since May 2011.*

## How green is my city?

A former Welsh Government Environment Minister was once heard to remark that environmentalists are very good at encouraging the people in his constituency to get out of town and visit beautiful and unspoilt places, but that they should actually spend more time working to improve the environment in Wales' towns and cities, where most people actually live. He had a point.

Taking a cue from this idea, both Natural Resources Wales (NRW) and the Woodland Trust have done a lot of work to make clear the huge contribution that greenery, and in particular trees, make to the quality of life in Wales' towns and cities.

**Urban tree inventory**

In September 2014 NRW published its excellent *Tree Cover in Wales' Towns and Cities: Understanding canopy cover to better plan and manage our urban trees*, which is downloadable from www.naturalresourceswales.gov.uk. In effect, it's an urban tree inventory which reveals the amount of tree cover in every town and city in Wales and flags up some of the many benefits it offers.

The data in the report is amazing. Tree canopy cover in every Welsh town and city has been accurately measured using aerial photography. It varies from 34% in Trimsaran in Carmarthenshire to just 4.5% in Fochriw, Caerphilly. How much is it where you live? The report stresses that trees are amongst the most versatile natural assets that planners, policy makers, businesses and communities can use to cost-effectively raise the quality of life in urban areas. Until now, however, we have known little about the urban tree resource. The hope is that this report will allow more strategic planning to ensure that we make the most of its potential.

**What have trees ever done for us?**

On the same day, NRW also published the results of an iTree survey of Wrexham. This revealed that Wrexham's trees save the local economy more than £1.3m every year. They intercept 27 million litres of rainfall before it enters the drainage system, saving the equivalent of £460,000 in sewerage charges. They absorb 1,329 tonnes of carbon dioxide from the atmosphere. And they improve health by removing 60 tonnes of air pollution, saving the health services £700,000.

Armed with these facts, the Woodland Trust organised a petition, which was supported by thousands and was presented to the Welsh Assembly in January 2016. It supports the principle that every town and city in Wales should benefit from a minimum of 20% tree canopy cover. It calls on the Welsh Government to create a challenge fund to support tree planting to improve the environments where people live. The Assembly will be dealing with this and responding during this year. On the other side of the world, the Australian Government has just established a national plan to increase urban tree coverage, to reduce heat and improve health outcomes. Why shouldn't Wales do the same?

NRW is well aware of the potential of trees and other vegetation to manage water more effectively in the urban environment. The Greener Grangetown project in Cardiff is an excellent example of how this technique is already being used. Individuals, too, are keen to defend urban trees and increase their numbers. Week by week, local people and communities across Wales make clear how important their local trees are to them. Most recently, local residents in Birchgrove in Cardiff have been protesting against plans to create a new bus lane which would remove trees along Caerphilly Road.

**Going native**

But if it is accepted that increasing tree canopy cover in towns is generally a good idea, the question arises of what kind of trees to plant, and where? There's no simple answer. It's a matter of taste. The Woodland Trust will of course make the case for native trees. After all, our wildlife, particularly invertebrates, are adapted to UK native trees. It is said that a mature oak tree can support over 280 species of insect. Ash trees, too, are noted for the sheer variety of wildlife they support, which makes the impending loss of so many of them due to *Chalara* such a blow.

The petition to the Assembly that the Woodland Trust organised made specific mention of fruit trees. There's huge interest in producing food close to home. One thing we all have in common as humans is that we all need to eat. So if Councils are planting trees in public parks, for

example, then why not plant apple, pear and plum trees? I have fond childhood memories of climbing pear and apple trees in our back garden during the summer holidays, to help ourselves to the fruit. Shouldn't children today have the same opportunities?

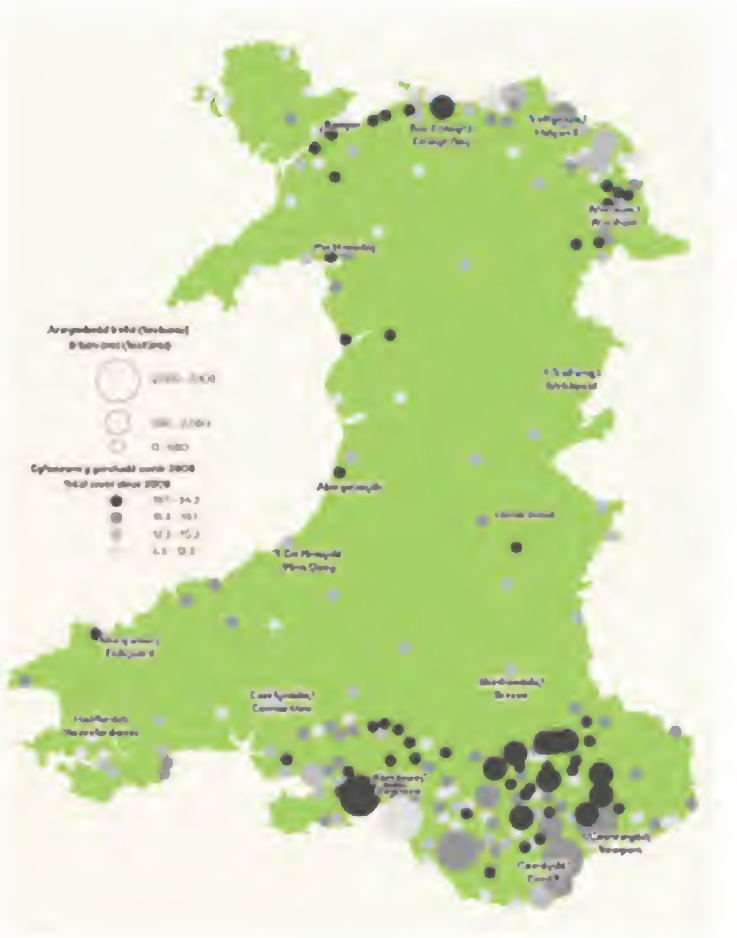
**The pros outweigh the cons**

One concern many Councils have is the size of urban trees. When trees grow very big, they sometimes need to be pollarded for safety reasons, at significant expense. As a result, smaller species are often preferred. While this is understandable, we should not forgot what the Wrexham iTree study tells us. That is, that while all trees potentially offer environmental benefits, it is the larger trees – the oaks, the ashes and the plane trees – that offer the most, simply because they have more leaves to clean the air, intercept rain water, and cast an attractive dappled shade. So the answer, as far as there is one, is to plant the right tree in the right place. If there is a constricted space by a roadside, then by all means plant small trees or shrubs. But if you have more space, maybe in a park or a square, then plant large trees that will offer the greatest benefits.

Not everything is rosy, of course. There are costs attached to managing urban trees over the years, and regrettably some councils have sought to save money by not replacing street trees which needed to be removed. And there's always a danger that insurance companies will encourage councils to be overly risk-averse when dealing with their trees, worrying about the minor risks associated with them without taking full account of the huge benefits they offer.

Exclusive and desirable residential areas of our cities are often referred to as 'leafy'. But shouldn't we ensure that people in every part of town enjoy all the benefits that trees can offer?

***Rory Francis*** *is Communications Officer for the Woodland Trust in Wales (Coed Cadw).*



# Natural Resources Wales: building a resilience

The Environment (Wales) Act will be the third in a suite of Welsh legislation – alongside the Planning Act and Well-being of Future Generations Act – designed to put sustainable development at the heart of Welsh public services. These could lead to a significant change in our approach to the intergenerational challenges we face, such as the decline in biodiversity, climate change, tackling poverty, and providing skills and employment.

Listed in the Well-being of Future Generations Act are seven well-being goals across which all public bodies in Wales must maximise their contribution. This means that public bodies can no longer focus on one objective over another, but must seek to contribute to all of the goals in all that they do. One of these goals is to have *"A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change."*

Within this context, the Environment Act gives Natural Resources Wales (NRW) a new purpose *"to pursue **sustainable management of natural resources**"* (SMNR) – confirming their unique role alongside other public bodies in Wales in helping embed sustainable development. The Act contains a definition of SMNR which can be summarised as:

- minimising the rate at which we use natural resources (locally and globally), and finding smarter ways to manage them more efficiently;
- building the resilience of ecosystems so that they can continue to deliver the breadth of benefits needed for future generations;
- seeking nature-based solutions to help deliver across the well-being goals.

The Environment Act includes a set of principles for SMNR which NRW must apply in the exercise of their functions. Adapted from the Convention on Biological Diversity (CBD) Ecosystem Approach, these principles guide planning and decision-making at any scale as a route to good practice and sustainable decision-making.

The Environment Act strengthens the existing NERC biodiversity duty so that public bodies in Wales *"must seek to **maintain and enhance** biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems…"*. In addition they must publish a plan setting out what they propose to do to comply with this duty, as well as producing tri-annual reports on what action has been taken. This provides an additional level of scrutiny around the actions of public bodies with respect to biodiversity.

The Environment Act does not replace the existing legislation which protects habitats, species and landscapes, but provides a lens through which we should consider these. It provides a framework for public bodies and decision-makers in Wales to better consider the consequences of their decisions on our natural resources, and the benefits that they provide, for both current and future generations. When in place, the framework will help communicate the priorities that need to be taken forward through existing delivery mechanisms – for example, land-use planning and rural development planning processes.

NRW is at the forefront of this new integrated approach to managing natural resources in Wales, and is building skills across the organisation to enable these principles to be applied to everything it does.

***Russell De'Ath***
*Senior Natural Resource Management Advisor, NRW*

**The Principles of SMNR:**

*a) **Manage adaptively** by planning, monitoring, reviewing and, where appropriate, changing action*
*b) Consider the appropriate **spatial scale** for action*
*c) Promote and engage in **collaboration and cooperation***
*d) Make appropriate arrangements for **public participation** in decision-making*
*e) Take account of all relevant **evidence**, and gather evidence in respect of **uncertainties***
*f) Take account of the **benefits** and intrinsic value of natural resources and ecosystems*
*g) Take action to **prevent** significant damage to ecosystems*
*h) Take account of the **short, medium and long term consequences** of actions*
*i) Take account of the **condition and resilience of ecosystems***

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